Our Culture, Our Value:
The Costs Of Hearing Loss In Australia

A research report by Per Capita for Deaf Connect and Deaf Australia

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We acknowledge the traditional owners of country and pay respect to past, present and emerging Elders.

We also acknowledge and respect the members of the Deaf community in Australia, who preserve their rich heritage, culture, and our language; Auslan (Australian Sign Language).
We also acknowledge our custodians of Auslan, promoting awareness, equality, and access through our sign language.
Through Auslan, we inspire future leaders in our Deaf community to continue our legacy and heritage.

View the companion reports and Auslan translations here

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About Deaf Australia

Deaf Australia was founded in 1986 as a peak national advocacy body that represents all Deaf, Deafblind hard of hearing people and others who live in Australia and use Auslan as their language of preference. The focus has and continues to be on developing access to information and accessible communication.

We work with Australian governments and collaborate with key stakeholders to make sure that Australia complies with the United Nations Convention on the Rights of Persons with Disabilities. The CRPD and the Australian Disability Strategy guides our work; we aspire to achieve equity for Deaf people across all areas of life.

About Deaf Connect

Deaf Connect is the largest whole-of-life service provider and social impact organisation for Deaf, Deafblind and hard of hearing Australians. We stand with the Deaf community to build capacity and influence social change while paying respect to history, culture and language.

Our focus is on community and empowerment, supporting Deaf Australians and their families to make choices and actions to thrive in life, while delivering on a national agenda to improve equity for the Deaf community, and to remove systemic cultural and language barriers.

About Per Capita

Per Capita is an independent progressive think tank, dedicated to fighting inequality in Australia. We work to build a new vision for Australia based on fairness, shared prosperity, community and social justice.

Our research is rigorous, evidence-based and long-term in its outlook. We consider the national challenges of the next decade rather than the next election cycle. We ask original questions and offer fresh solutions, drawing on new thinking in social science, economics and public policy.

Our audience is the interested public, not just experts and policy makers. We engage all Australians who want to see rigorous thinking and evidence-based analysis applied to the issues facing our country's future.

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At PerCapita, Michael serves and Chief Economist and Head of Data Science, focusing largely on leading economic evaluation, economic modelling, ensemble forecasting and interdisciplinary research projects. Michael has served as a health economist and advisor to a number of refugee, youth and health focused charities, including Anchor, YouthConnexions, DCS, Deaf Connect, Deaf Australia, as well as peak hygiene charity Pinchapoo. In addition to working with PerCapita, Michael advises on the design of courses in Research Methods with a leading Australian university.

Prior to working in the NFP sector Michael worked with PwC, KordaMentha, AusAid, Victoria University and the University of Melbourne. Michael has served on a number of university boards as a Non-Executive Director and Deputy Chair. Michael is a recipient of the LexisNexis/Butterworths Prize, an Australia Endeavour Award, and the Alfred Deakin Medal.

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Emma has published reports and articles on a range of policy issues. She is a regular contributor to Guardian Australia, The Age/SMH and the Australian Financial Review and is a frequent guest on various radio programs nationally. She appears regularly as an expert witness before parliamentary inquiries and often speaks at public events and conferences in Australia and internationally.

Emma is the co-author of Per Capita's landmark report Measure for Measure: Gender Equality in Australia, and co-editor, with Professor Janet McCalman, of the collection of essays What happens next? Reconstructing Australia after COVID-19, published by Melbourne University Press in September 2020.

Introduction

The economic impact of deafness is very large, with a recent estimate suggesting that the costs exceed 1.303 trillion dollars globally (WHO, 2021). Approximately 57% of these costs are incurred by middle-, lower middle-, and low-income countries (McDaid, 2020). Nonetheless, costs remain high within OECD countries, particularly in relation to care, productivity, and quality of life (Ibid, 2020). Yet many of these costs are avoidable and may be reduced through early intervention, expedient screening, and other care and productivity responses.

Within Australia, deafness significantly impacts the quality of life of many, resulting in consequences for health and wellbeing outcomes. Similarly, the costs associated with absenteeism and presenteeism are also high, impacting national productivity. However, early intervention, depending on its approach and strategies, can mitigate many of these costs, affording recipients significant lifetime benefits. Several interventions are possible, though unhelpfully they are often presented as either/or opportunities resulting in individuals not benefiting or achieving lower levels of benefit that is possible.

Understanding the costs of deafness is instructive in policy formulation and analysis and provides significant insight into the challenges faced by many Australians. The present report does not consider the specific viability of particular models of medical intervention. The intention of this present report is to quantify the costs of deafness, with a particular focus on the emerging costs of deafness associated with language deprivation, and the associated syndrome. Unfortunately, the impact of language deprivation is not considered significantly within the cost quantification of deafness literature. Our report reflects this specific lack of analysis.

Additionally, little is known about the costs associated with the delivery of mental health services to individuals that experience language deprivation, or the impact of age-associated deafness on mental health services access.

However, the economic benefits associated with interventions which promote improved capabilities and address the impacts of deafness are better understood and are considerable. Improved educational outcomes and labour market participation rates are significant considerations, and even modest improvements of these among the Deaf and hard of hearing community would result in substantial benefits for the wider Australian economy. Similarly, solutions to improve the engagement of Deaf people with gainful employment and service access, will improve both economic and wellbeing outcomes. with gainful employment and service access, will improve both economic and wellbeing outcomes.

Understanding Deafness through a cultural lens

Members of the Deaf community usually see themselves as forming a linguistic-cultural community, although some may also identify with the disability sector to varying degrees.[1] This is frequently not acknowledged or well understood within Australian society.[2] As noted by the WFD (2019) “Deaf people consider themselves as a linguistic and cultural group, with highly complex natural languages but the rights of deaf people are however assured through disability policy, legislation and international instruments. Deaf identity is not a monolithic entity, and a person can also have other identities relating to gender, race, disability, socioeconomic status.”

Deaf, Deafblind and hard of hearing people in the Deaf community use Auslan as their preferred language in Australia: it is considered the language of the Deaf community . It is therefore critical to consider the role of Auslan and its benefits to the Deaf community, and the associated economic benefits more broadly. Deafness is too frequently misunderstood by policy makers, because it is frequently viewed employing a medical-disability model exclusively, with limited regard for the cultural-linguistic lens. This is because there is limited consideration given to the evidence base, and many researchers within policy units possess limited knowledge of the Deaf community.

This report is informed by direct engagement with the Deaf community and the evidence base pertaining to early intervention, Auslan usage, bi-modal bilingualism and the impacts of deafness.

Scope of Research

The present report considers the economic benefits of Auslan accounting for the critical benefits to wellbeing, health literacy, services access, and the productivity of the economy. The research seeks to account for the benefits associated with Auslan as a community-enabling and culturally supportive language.

Per Capita’s economic evaluation framework and modelling has been developed using publicly available information, as well as data supplied by commissioning entities. The assumptions are based on credible research that has been subject to peer review, with the assumption set then applied to the economic and financial datasets to arrive at our impact estimates.

We employ a scenario forecasting approach, deriving from the extant literature that explores the impact and benefits of Auslan to consider a scenario where Auslan did not exist, and what the costs and impacts of this significant absence would be. The absence of longitudinal data capturing Auslan capability and language exposure/deprivation data involving an adequate sample cohort, over an adequate time interval, makes primary estimation challenging.

1 This ‘identification’ may be due to the process of categorisation in civic systems, rather than identification as a member of the disability community.

2 For an excellent summary article on Deaf Culture see Carty, B., 1994. The development of deaf identity. In The Deaf Way: Perspectives from the International Conference on Deaf Culture, Washington DC (Vol. 40, p. 43). For a note on the experiences of Deaf Individuals In the health care system see Beaver, S. & Carty, B. (2021). Viewing the healthcare system through a deaf lens. Public Health Research and Practice, 31(5):e3152127.

Given this dearth, we rely on shorter episodic research and smaller sample sizes, and therefore there is a degree of uncertainty associated with the estimate set. All studies of this nature evidence a degree of uncertainty and we therefore note that the caution afforded this category of studies be afforded the present report.

While all estimates evidence a degree of uncertainty, we assert that the modelling is based on a sound research base and assumption set and offers a conservative evaluation of the benefits of early language intervention.

Key Terminology

The terms deaf and Deaf will be used according to their cultural definitions amongst the Australian Deaf community, consistent with the extant literature and the guidelines provided by Deaf Australia. People who identify as "culturally Deaf" are more likely to have been born deaf or become deaf early in life, are pre-lingually deaf and use sign language as a primary or preferred mode of communication. Deaf people of the western world identify as a culture with distinct languages and customs, in the same way that people of any particular ethnic group may identify as belonging to that culture, with specific practices and approaches to communication.

Auslan – Auslan is the name given to Australian Sign Language, which is the natural language signed by members the Australian Deaf, Deafblind and hard of hearing community

Deaf – The use of a capital "D" in "Deaf" is often used to identify a person or a group as sharing the language and culture of the Deaf community. An individual that identifies as Deaf may employ a number of different methods of communication including different modalities, or multiple modalities. However, there is an emerging trend away from this usage of "D" (see, e.g., Kusters et al, 2017), as it can be seen to create unnecessary dichotomies within a community which exhibits considerable diversity. It is most often used when referring to groups or entities such 'the Deaf community', rather than when referring to individuals.

deaf – denotes auditory deafness, clinical deafness rather than referencing Deaf culture and the Deaf community. However, see previous entry for information about changing usage of "d/D".

Bi-modal bilingualism – describes bilingualism which incorporates the use of languages in both oral and signed modalities (herein Auslan and English).

BANZSL – British, Australian and New Zealand Sign Language is a language family, of which British Sign Language, Auslan and New Zealand Sign Language may be considered to be member languages.

HALY – Health Adjusted Life Year: A burden of disability measure based on how many years of life are lost or affected by the condition.

DALY – Disability Adjusted Life Year: A type of HALY method based on accounting for the number of years lost, and number of years impacted by a disability.

QALY – Quality Adjusted Life Year: A type of HALY based on making an estimate of the quality of life, hence the name Quality adjusted life year. The measure includes both a quantity of life and quality of life estimate.

YLL – Years of Lost Life due to disability

YLD – Years of Life impacted by a disability

Cultural dysfluency – People experience cultural disfluency if a culture-based expectation is not met, or where they lack a cogent knowledge of their culture due to separation or a lack of exposure.

Early intervention – the process of identifying risks and engaging in appropriate interventions to minimise the likelihood of adverse consequences for children and young people. Herein unless otherwise stated the use of the expression pertains to Auslan/Sign language based early intervention

Language deprivation – The deprivation of access and exposure to language. May result in cognitive deficits and 'language deprivation syndrome', a form of language and cultural dysfluency.

Language acquisition – the process of acquiring a first language, sometimes also a second language if it is acquired very early. First language acquisition is acquisition of the native language of the individual. Language acquisition should be distinguished from language learning, which is a more structured process for learning a second or subsequent language.

Research approach

In formulating a viable and appropriate research strategy to undertake the research and associated analysis, we engaged in a series of consultations with a number of different research partners and stakeholders from the Deaf community, the research community and with several peak organisations within the sector.

Presentation of research strategy and methodology to stakeholders

Upon establishing a viable research framework we initiated a consultation process with representatives of the Deaf community and services sector. During these consultations we outlined the following;

1. The methodological approaches proposed for the research
2. The availability of different data sources (and those that required specific permissions)
3. The approaches available for the dissemination of research

We obtained feedback from the group and sought to reflect this feedback in the research methods to the extent appropriate.

Research Reference and Advisory Group

While engaging in this research we have sought feedback from and consulted with experts from the Deaf community, academia, and health economics. The reference group informed the following aspects of the research.

- Offering insights into new and compelling research
- Offering comment on the DALY and benefits evaluation methods
- Providing support in securing key third party datasets
- Supporting the communication and dissemination of findings

Members of the Research Reference and Advisory Group

We would also like to acknowledge the significant efforts of the reference group.

Dr. Breda Carty – Adjunct Fellow – Macquarie University

Matt Lloyd Cape – Manager – Research and Advocacy – Per Capita

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Expression Australia

What causes hearing loss?

Herein, we refer to hearing loss given its use within current research and by Australian health agencies, noting that within the Deaf community and Deaf culture, such terminology is not the nomenclature. Hearing loss may range from very mild loss levels to profound hearing loss. The impact of different levels of hearing loss differs markedly and necessitate different interventions depending on both the timing and extent of hearing loss. There is limited scope for a one size fits all response given the diversity of impacts and causes that underlie the loss. Hearing loss at the time of birth is referred to as congenital hearing loss. Hearing loss that occurs after birth is referred to as acquired hearing loss.

Hereditary disorders, genetic disorders and prenatal exposures are causes of hearing loss frequently affecting children. The frequency of deafness has fallen since the introduction of the Rubella vaccination program (Johnston, 1990). Other causes of deafness include exposure to noise, specific trauma, or disease exposure both during adulthood and childhood. Otitis media may also result in hearing loss though it is usually temporary. Improved quality of care and service provision has reduced the frequency of most causes of deafness, through hearing loss resulting from noise exposure remains a significant factor. The rate of permanent pre-sensorial hearing loss in Australia is about 1-2 per 1000 (Punch, 2022). This means that about 305 – 610 children are born each year with permanent pre-sensorial hearing loss.

Hearing loss is a particularly significant challenges for Australia's First Nations with the RACGP noting that "hearing loss is a significant health problem faced by Aboriginal and Torres Strait Islander people, mostly caused by chronic otitis media (middle-ear infection) during childhood" (RACGP, 2022). The rates of otitis media are amongst the highest in the developed world, with First Nations children 5 times more likely to be diagnosed with otitis media than non-indigenous children (RACGP, 2022). AIHW (2022) notes that First Nations Australians are twice as likely to report hearing issues as non-indigenous Australians.

Table 1 – Causes of Deafness and Hearing loss

Hereditary conditions	Some types of hearing loss are hereditary, which means parents pass on affected genes to their children. In most cases, hereditary hearing loss is caused by malformations of the inner ear
Genetic disorders	Genetic mutations may happen: Some of the many genetic disorders that can cause hearing loss include osteogenesis imperfecta, Trisomy 13 (Patau syndrome) and Treacher Collins syndrome
Prenatal exposure to disease	A baby will be born deaf or with hearing problems if they are exposed to certain diseases in utero, including Rubella (German measles), influenza and mumps. Other factors that are thought to cause congenital deafness include exposure to methyl mercury and medications such as quinine
Noise	Loud noises (such as gun shots, firecrackers, explosions and rock concerts), particularly prolonged exposure either in the workplace or recreationally, can damage the delicate mechanisms inside the ear. If you are standing next to someone, yet have to shout to be heard, you can be sure that the noise is loud enough to be damaging your ears. You can protect your hearing by reducing your exposure to loud noise or wearing suitable protection such as ear muffs or ear plugs
Trauma	Such as perforation of the eardrum, fractured skull or changes in air pressure (barotrauma)
Disease	Certain diseases can cause hearing loss, including meningitis, mumps, cytomegalovirus and chickenpox. Severe cases of jaundice can also cause hearing loss
Other causes	Other causes of deafness include Meniere's disease and exposure to certain chemicals.

Source: Department of Health Victoria (2022) (Adapted)

Understanding differences in the severity of hearing loss

The severity of deafness may vary markedly between individuals. There are scales that are employed to consider the extent of hearing loss.

Table 2 – Severity of hearing loss

Degree of hearing loss	Hearing loss range (dB HL) Clark (1981)/ASHA	British Society of Audiology	Office of Hearing Services
Normal	-10 to 15		
Slight	16 to 25		
Mild	26 to 40	21 to 40	25 to 45
Moderate	41 to 55	41 to 70	45 to 65
Moderately severe	56 to 70		
Severe	71 to 90	71 to 95	65+
Profound	91+	95+	

Source: Clark, J. G. (1981). Uses and abuses of hearing loss classification. Asha, 23, 493–500; British Audiology Society (2022), Office of Hearing Services (2022)

The present report ascribes estimates of the impact of deafness based on the severity of deafness, employing the Global Burden of Disease (2020) estimates. These estimates are employed to determine the cost of deafness and hearing loss to wellbeing, employing a DALY method.

Different frequency intelligibility

Individuals that are hard of hearing may differ in their capacity to discern sounds at different frequencies. All audible speech is made of sounds that are at different frequencies and these frequencies are measured in Hertz (Hz). The strings at the top of a guitar and high notes of a piano keyboard are in a higher frequency range. The ability of an individual to discern certain frequencies may not be consistent. A child may for example have the same observed level of deafness regardless of frequency or have different levels of hearing across a frequency spectrum. If a child were to exhibit lower levels of hearing ability within lower frequency ranges, they may find it harder to discern certain words.

Speech is made up of both consonants and vowels, with consonants appearing at higher frequencies generally, and communicating much of the information that makes speech interpretable. Therein, being able to hear these frequencies is essential to the intelligibility of speech for a child.

What are the impacts of hearing loss?

The impacts of hearing loss are diverse and differ based on age, quality of interventions received and the timing of interventions, as well as the prevalence of comorbidities that may exacerbate or be exacerbated by comorbid conditions. The impacts of hearing loss are not merely isolated to the health care system; hearing loss also impacts productivity, education and workplace absenteeism and presenteeism. Broadly the costs associated with individuals being D/deaf or hard of hearing may be classified into four broad groups.

Figure 1 – The costs associated with Deafness/Hearing loss at a national level

While each of these categories appears independent, it is important to appreciate that there are strong interaction effects that arise consequential to the logical interactions that occur across each of these spheres. Health and health status is indelibly linked to education, both access and attainment, with better health associated with better learning outcomes. Similarly, both health and education are associated with quality of life with higher education and better health outcomes associated with better quality of life. Health, education and quality of life impact employment and productivity, and the relationship is bi-directional. Nonetheless, when estimating the costs of hearing loss, it is useful to consider the costs through each of these dimensions discretely.

Education system impacts

Hearing loss has significant implications for educational access and attainment. Where a child is deaf or functionally hard of hearing, absent of intervention to support viable language and communication development, evidence suggests that a differential rate of learning will be achieved. Humphries et al. (2014) suggests that the rate of learning for a hard of hearing child is between 40% and 60% lower than their hearing peers. Absent of intervention, this differential has implications for educational attainment, a key determinant of health, productivity, and quality of life.

Children that are hard of hearing are therefore likely to evidence developmental deficits, absent of intervention. Effective early intervention has the potential to attenuate and or address preventable deafness and improve the quality of life for individuals that are profoundly deaf and hard of hearing. The identification of hearing loss at the earliest point has been identified as critical to the success of intervention with studies determining that identification during infancy, then supported by a suitable intervention by the age of approximately 6 months makes normal language development a possible outcome (see inter alia Anderson, 2006; Arehart & Yoshinaga-Itano, 1999; Schick, 2003; Yoshinaga-Itano et al. 1998).

This matter is addressed in greater detail, and with reference to the benefits of early intervention to the redress of impacts of disability, in our earlier report titled “Exploring the benefits of early intervention for deaf children”, which offers preliminary estimates of impact of intervention timing employing a DALY method.

Adults that evidence hearing loss are likely to evidence a lower learning rate, and this will impact their self-efficacy as they age. The prevalence of co-morbidities that coincide with hearing loss frequently are likely to compound the impact of hearing loss. More research is needed pertaining to the impact of deafness when presenting with other comorbidities in accessing civic services, and in educational attainment.

Deaf individuals are likely to achieve lower levels of tertiary education than hearing peers. Several reasons are proffered for the difference: access exclusion, self-exclusion, self-efficacy and systematic factors (including the challenges of self-advocacy, language deprivation due to inadequate support, lack of appropriate educational support and models, and an educational environment calibrated for hearing persons). It is critical that in understanding the issues of diminished self-efficacy and self-exclusion that blame is not ascribed to deaf people, given the impact of systematic factors that serve to disincentivise and discourage their participation in systems of education. These lower levels of education coupled with lower labour market participation rates result in lower lifetime earnings for Deaf people, as well as lower tax revenues accrued by government. It is predictable that the lower rate of labour market participation and education attainment coincide with higher levels of welfare support.

Language deprivation and dysfluency

Arguably the most critical challenge for a child that is deaf or hard of hearing is overcoming the risk of language deprivation so that they can engage with their family, peers and access critical developmental benefits.

This is critical for all children but arguably most critical for deaf and hard of hearing children: deaf children risk not possessing first language competence in either a spoken or signed language. This will result in such children processing language without the benefits of native language proficiency in communication. A number of intervention strategies are available depending on the child and their circumstances, from Auslan exposure and learning, oral/aural methods, cochlear implantation, or a combination of those noted, acknowledging this is a non-exhaustive summation. Where a child lacks language competence the associated costs of educating the child and the child’s learning rate are likely to differ from those of their peers, whether deaf or hearing. Research suggests that children that are able to benefit from early intervention, are often able to achieve developmental progress similar to that of their hearing peers.

Language deprivation syndrome (Humphries et al. 2014) is a term used to describe deaf persons who are not able to functionally engage in communication, diminishing their self-efficacy. There is only limited research on language deprivation as a phenomenon, and much of the research considers the broader mental health and physical health implications of deprivation. It is however predictable that individuals evidencing high levels of language deprivation as they age would also evidence lower learning rates, and consequently face greater risk of employment loss and possess inhibited re-training capabilities.

Health care system impacts

Health services knowledge and health services access is critical to promoting beneficial health outcomes. Deafness directly impacts the ability of individuals, both young and old, to access health services.

Historically, deaf people have observed poorer health outcomes than their hearing peers, though this is not a consequence of hearing loss per se. Rather it is the lack of culturally aware/ sensitive, accessible, and appropriate services, and service delivery models that have impacted service access. There remains a genuine dearth of viable services for members of the Deaf community.

Service deficits are greater for First Nations groups given the significant shortage of certified interpreters from Aboriginal and Torres Strait Islander communities, and the dearth of interpreters within rural and regional communities. Interpreter shortages impact health service access, and create challenging situations for members of the community, that are at the expense of their privacy and self-efficacy, including having to involve and or rely upon familial connections or friends in service access, or forgo access entirely. Children are at greater risk of adverse health outcomes.

As noted, deafness ranks as one of the most frequent co-morbidities with other serious illness amongst the young and increases as people age. When considering pre lingual deafness specifically, the high frequency of co-morbid conditions is likely to exacerbate the challenges associated with each. The challenges associated with the provision of service in a manner that is culturally safe and/or personally aligned remains challenging given that the care recipient may require remedies and knowledge from multiple parties. This means that they lack a single source of truth and may lack a single point of service coordination.

The elderly may choose to opt out of inaccessible services where they possess limited self-efficacy and or inhibited personal agency. Similarly young deaf people may be less likely to engage with critical service providers for similar reasons. Again, it is imperative to acknowledge that blame is not ascribe to deaf people, as the drivers of inhibited personal agency are due to the design of civic systems in a manner that is inconsistent with the needs of the Deaf community. This makes delivering services more costly, absent of coordinated responses. The role of the NDIA (for those below the age of 65) and Home Care package solutions is critical as individuals from the Deaf community age, as co-morbidities arise; and for the broader community as deafness and hearing loss arise through aging,[3] and may arise with co-morbid conditions.

The emerging impact of language deprivation is also pertinent to acknowledge, with US research suggesting that the impacts for health service delivery are nothing short of 'game changing'. Language deprivation is considered in greater detail within our recent report titled "Our Culture, Our Value: The economic benefits of Auslan". For further analysis on this emerging challenge see, inter alia, Hall (2017), Humphries et al. (2014).

There are several direct system costs that arise from deafness and hearing loss treatments. These costs include the costs associated with health service delivery, appointments, intervention strategies, surgical procedures and general separation costs associated with hospital stays and treatment.

Some of these costs may be minimised or avoided through quality earlier intervention. Others may be better managed through service coordination. Others still may be addressed through culturally affirming service delivery and addressing service shortages within key access areas. This matter is considered in our report titled "Our Culture, Our Value: The economic benefits of Auslan.

Employment and Productivity impacts

Members of the Deaf community face challenges in securing formal employment at the levels commensurate with the national averages. These challenges are often consequential to inadequate work adjustments, comorbid conditions and potentially inadequate work pathways. Deaf people also participate in the labour market at lower rates, but at higher rates than the national averages across disability categories. This lower rate of labour market participation is at the expense of economic activity, therein productivity capability is not flowing into the economy.

Individuals acquiring deafness later in life also face significant challenges in maintaining gainful employment. A significant number of individuals involved in trades that have become deaf or hard of hearing as a result of noise exposure find it more difficult operating within their existing vocational setting because of a lack of workplaces who will modify the space to accommodate such employees.

Absenteeism and Presenteeism

Absenteeism and Presenteeism are major challenges for the economy, and all employees evidence some degree of absenteeism and presenteeism over the course of their employment, regardless of hearing status. Absenteeism is therefore a significant challenge, and a cost to firms and the economy. It is a pattern of absence that impacts overall labour productivity and may impact morale

3 The scope of the present research is the Auslan user community, specifically those individuals that utilise Auslan; and individuals with pre-lingual deafness including individuals utilising bi-modal, bi-lingual approaches. The research does not consider the costs associated with aged based deafness.

and employment satisfaction. Deafness, and hearing loss more broadly, impact rates of absenteeism. This is well documented in a number of country-specific studies, albeit with few studies research conducted within Australia.

A study conducted by Kramer (2006) explored the rate of absenteeism within deaf and hearing employee cohorts (albeit with limited controls for confounding effects) noting that the deaf cohort evidenced an annual rate of absenteeism of 26.3 days per year while the hearing cohort evidenced a rate of absenteeism of 6 days per year. This equates to a differential of 20.3 days. A similar study by Nachtegaal (2012) identified a differential of 3.5 days. Deloitte Access Economics (2017) note that "...hearing loss can have a significant impact on an individual's ability to work. This may include a reduced chance of employment, premature retirement, a greater number of sick days than average, or a diminished capacity to be productive at work due to impaired ability or psychological stresses."

Nonetheless this research literature is useful in establishing the impact of deafness and hearing loss on absenteeism. It is highly plausible that the higher rates of absenteeism associated with hearing loss are due to the lack of viable support and employment facilitation afforded to the Deaf and hard of hearing communities.

Presenteeism or working while sick is the act or culture of employees continuing to work as a performative measure, despite having reduced productivity levels or negative consequences. Presenteeism occurs regardless of hearing status. Studies have explored presenteeism within deaf communities, noting rates of presenteeism are nominally higher amongst deaf and hard of hearing staff than their hearing peers (Nachtegaal, 2012). The costs of presenteeism are significant, as the behaviour is a drain on firms and the economy.

The estimates of Nachtegaal et al. (2012) suggest that the variation in the rates of presenteeism result in a productivity loss of (on average) 2.8%. It is critical to acknowledge that these elevated costs of presenteeism may be consequential to the inability of firms to provide a culturally safe environment or a lack of support provided in a culturally appropriate manner.

Quality of Life impacts

The World Health Organisation (2022) defines the concept of quality of life as "an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns". Quality of life is a capture of the benefits an individual derives from life.

The Global Burden of Disease studies provide an evidence-based mechanism to analyse and estimate the costs of specific conditions and their associated quality of life impact. Deafness has the potential to significantly impact the quality of life of deaf persons. We employ GBD estimates from the most recent study iteration. In our report titled "Our Culture, Our Way, the economic benefits of Auslan", we illustrate the capabilities benefits of Auslan. Other research has illustrated the benefits of alternative interventions. Understanding the role of intervention, and timing of intervention in the alleviation of quality-of-life impacts is critical to their redress.

Within the present study as with our most recent studies exploring Auslan and early intervention we employ a DALY approach to determining the impact of deafness and hearing loss. We employ the estimates contained within those reports and derive estimates from distributions of hearing loss by age to determine the total costs of deafness and hearing loss.

Estimating the costs of hearing loss

A number of methods are employed in cost estimation. As with all modelling that involves scenario analysis there is a degree of uncertainty. All estimates are based on credible, peer reviewed research, where the peer reviewed studies' postulates support the assumptions within the modelling. There are studies that inform the present research; we highlight the studies of note with Appendix 3 – Principal studies supporting modelling assumptions.

The global cost of deafness

As a precursor to examining the estimates of the costs of hearing loss in Australia, we have included the percentage distribution of cost estimates of McDaid et al. (2022). The costs of deafness globally exceed one trillion dollars. These costs evidence the global challenge of deafness and provide a set of benchmarks of sorts for specific subcategory costs which allows for some degree of comparison.

Table 3 – Global cost category distribution using Global Burden of Disease higher estimates for prevalence and years lived with disability for hearing loss in 2019 (2019 International $ millions)

Category cost	Health Care Children*	Health Care Adults*	Total Health Care Costs*	Education Costs §	Productivity Losses §	Quality of Life Costs ß	All Costs
% of total costs	1.36%	24.35%	25.70%	2.69%	14.67%	56.93%	100.00%

* At least moderately impaired hearing only. § At least moderately – severe impaired hearing only. ß All impaired hearing.

While the costs of hearing loss are borne largely by individuals within middle-income, and lower middle-income countries, they are very high within high-income countries (McDaid et. al. 2022). The percentage distributions are highly instructive, with the greatest costs associated with a diminution in the quality and quantity of life of those impacted by hearing loss. Direct expenditures on health care services are the next most significant cost, with productivity costs accounting for nearly 15%.

The costs of pre-lingual deafness and profound post-lingual hearing loss

The present study differs from earlier estimates of hearing loss in scope and focus. While earlier studies account for all prelingual deafness and all hearing loss including hearing loss associated with aging, the current study is focused on the sign language user cohort, specifically the individuals that employ Auslan as their primary means of communication, regardless of additional modalities. This cohort is largely constituted by a significant number of individuals with severe or profound deafness and may be as large as 30,000 individuals. This community see deafness largely through a cultural lens, rather than as a deficit, acknowledging Deafhood as a source cultural association.

Health care system costs

We model the health care system costs, using a broad range of data sources. These include AIHW datasets, Access Economics/ Deloitte Access Economics datasets and estimates, Orima Research datasets, Treasury Department estimates (VSL estimates). These datasets and estimates are outlined in Appendix 2. Additionally, the principal studies that underlie the assumptions employed within the modelling are outlined throughout the report.

Costs of separation

Costs of separation are based on Deloitte (2006) data capture of separation statistics, from the National Hospital Morbidity database. There are an estimated $3,992 ($3,543 adjusted for demographic changes) separations. The cost of the average separation was $4,884 in 2022 dollars. **Therefore, the total expenditure associated with deaf patients admitted for hearing loss was $300,807 in 2022.**

Costs of Outpatient expenditure

Estimates of the costs of outpatient expenditure derive from AIHW (2019) estimates and Deloitte (2014). We inflate the initial outpatient estimates to account for demographic change and the anticipated rise in service events. **The derived estimate of the cost of deaf outpatients is $182,595.**

Costs of Otitis media treatment

While otitis media impacts hearing intertemporally, capturing this cost data is critical to understanding this issue set, and the acknowledgement that recurrent or prolonged otitis media is a serious health concern. Absent of treatment in a timely manner otitis media may result in hearing loss. Inclusion of the costs of otitis media treatment costs here is principally because otitis media issues frequently recur and have high recurrence incidence rates within First Nations communities, which may be consequential to service shortages and health literacy supports.

While we have excluded the cost of otitis media from our aggregate/overall cost estimates, given that the condition is not a direct cost of deafness, we have included them here for discussion purposes. The cost of otitis media treatments in 2020 was $310 million dollars based on data supplied by AIHW (2022). **Accounting for health inflation costs results in an estimate of $324,000,000 in annual terms in 2022 dollars.**

Cochlear implantation expenditure

The investment in cochlear implants can yield significant benefits to recipients of implantation. We employ the cost estimates provided by firm reporting on the cost and procedure counts and then adjust these costs for the rate of inflation to assess the overall costs in present dollar terms.

AIHW (1991) notes that estimates of the cost of cochlear treatment are approximately $35,000 and $25,915 for the first year for four-year-old children and adults respectively. These estimates are in 1991 dollar terms, for the first year. Kehran (2014) and

Deloitte (2014) presents a more recent set of estimates of the cost of cochlear implantation. The costs estimates are based on the level of funding allocated to the cochlear implantation program. It is estimated that the cost of a cochlear implant, inclusive of associated care expenses, is $55,714, in 2014 dollar terms. This equates to $71,353 in present dollar terms. It remains difficult to ascertain whether the rate of health inflation has resulted in such a substantial increase in cost, and there for conservatism we include the initial estimates of Keran (2014) and Deloitte (2014).

We account for the current frequency of implantation reviewing estimates provided by Cochlear Australia (2020). Cochlear Australia (2020) notes a bilateral implantation rate of around 30 per cent has been established since the 2007 financial year. Given the underlying trend in implantation we estimate that there are 1584 implantation recipients in 2022.

The total cost of cochlear implantation was estimated to be $91,764,417.[4]

Cost of implant maintenance

The costs of maintenance associated with an implant are not captured in the earlier estimate. To determine the cost of cochlear implantation maintenance we consider the estimated number of implantations, and then account for bilateral implantation frequencies.

Implant maintenance is estimated based on the current number of individuals with cochlear implants in Australia. Cochlear Australia estimates that there are around 14,000 implantation recipients presently in Australia. Therefore, there are an estimated 10,769 current beneficiaries of implantation.

The cost of maintenance may vary depending on the timing of implantation. It is recommended that device processors are upgraded every 4 to 6 years to ensure sound functionality, and delayed maintenance may prevent the device from being updated. The standing committee on health aged care and sport presented a maintenance estimate of 8000. This assumes an annual rate of $1,600.

Therefore, the estimated cost of implant maintenance is $30,824,000.

Hearing aids, assistive technology and intervention, including rural and regional intervention support

The benefits of hearing aids are highly significant to recipients across the age spectrum. The cost of hearing aids is captured through the aggregation of both public and private provider costs, noting the dual model of service access. Some cost may not be captured in full due to the purchase of devices from online vendors in foreign jurisdictions, and consequently the current costs may be understated.

Other assistive technologies are employed beneficially by Deaf and hard of hearing people, with these device costs carried or subsidised by the Australian Government Hearing Support Program. The NDIS and HSP work together to provide support to Deaf and hard of hearing people, and the extent of support provided through each scheme is based on the severity of hearing loss and any comorbid conditions. The NDIS only funds individuals over the age of 26 that are not eligible for the HSP. We employ 2019 estimates to exclude the impacts of COVID 19 on actual and budgeted expenditures. **The cost Hearing Support Program budget attributable to the deaf community is $4,227,398.**

Please note that some individuals may use consumer grade hearing devices and noise cancelling devices such as earphones and headphones, or other assistive devices to access digital media given the progression of hearing loss. Such costs are difficult to establish and quantify absent of dedicated research. Many of these cost items are captured by the HSP, but this is only to the extent that individuals are covered by the scheme, the extant data does not provide an indication of private market purchases.

Hearing aid replacement and maintenance costs

There are a significant number of hearing aid users in Australia, with users benefiting from the national HSP, as well as procuring devices from private providers. Devices require maintenance from trained audiologists. There are an estimated 108,395 hearing aid users in Australia in 2022, deriving from forecasts conducted by Per Capita based on data presented by Cochlear Australia and Access Economics (2006). When accounting for the purchases over the interval and the replacement rate it is assumed that there were 36,103 hearing aids requiring replacement totally nationally. **The maintenance cost attributable to the Deaf community equates to a cost of approximately $917,993 in 2022 terms. The cost of maintenance for the Deaf community equates to $64,431 annually.**

Costs of hearing aid refitting services

There are costs that attach to hearing aid fitting and service fees. These courts are outlined in the HSP and differ based on whether fitting is initial (in the first instance) or subsequent (a refit for an existing hearing aid user). Variations also exist in costs for single ear or bilateral fittings. **The cost associated with service provision is $172,357.**

GP Consultations

The average cost of consultation has risen markedly in recent years to $90 (Medicare rebate $38.20). This is a substantial cost, and the cost is greater for extended consultations at $180 with a $73.94 rebate level. To determine the costs associated with consultations we consider the number of ear consultations, and control for hearing loss specific consultations. Hearing loss consultations are anticipated to be 12.4 percent of all consultations per HCIA (2017). We estimate the number of total consultations in 2022 terms accounting for changes in the population, and estimate the total consultations to equate to 2,566,342, with hearing loss specific consultations equating

4 Health inflation estimates are not applied to this value to ensure conservatism, as they may result in an overstated cost of implantation.

to 318,226 in total nationally. **Accounting for the current frequency of consultations within the Deaf community the current cost of consultation, assuming for conservatism the short consultation rate, the overall cost is $441,896 – $883,753 annually.**

Allied health services

Members of the Deaf community and individuals impacted by hearing loss may need to access specific allied health services more frequently than peers given their specific set of needs. There is limited data pertaining to health service access beyond estimates provided by Orima (2003). Additionally, research is required that controls for comorbid conditions. Consequently, we do not include a cost item within this category.

Additional health services

Pathology, additional medical and pharmaceutical costs are also incurred at elevated levels. The estimates are based on Deloitte (2014) estimates pertaining to these specific cost categories. The values are inflated to present dollar values using the rate of health inflation. **The total cost of additional health services is $1,703,326.**

Employment and productivity costs

Hearing loss significantly impacts labour market productivity, market participation and educational attainment. The costs associated with these impacts are significant, albeit difficult to fully capture. Within this segment of the report, we employ ABS data (ABS 2015a, 2015b, 2018a) estimates deriving from the extant research on deafness (McDaid, 2014) and productivity and prior estimate sets (Orima, 2003, Access Economics 2006, Deloitte Access Economics, 2014, PwC 2019) to quantify the cost of deafness on employment and productivity. We also employ data generously provided by Expression Australia, NAATI and the commissioning entities to establish several key estimates.

Educational attainment, Employment and labour market participation

There are significant differences observed in the levels of labour market participation between individuals that evidence hearing loss and those that do not. This is reflected in ABS datasets exploring labour market participation and observed in the broader employment and labour markets literature (see Winn 2007, Hogan 2009).

By accounting for employment differentials across the age spectrum we are able to account for the overall differences in employment earnings between individuals with hearing loss and individuals not impacted by hearing loss. **The total economic cost associated with lower levels of employment for individuals with hearing loss is $75,931,267.**

Post-lingual deaf and hard of hearing persons and educational attainment

It is difficult to establish the impact of post-lingual deafness on further education, and the associated differential when comparing post-lingual deaf persons' participation in education with their hearing peers. Consequently, we do not include a specific cost item to reflect the cost of post-lingual deafness on lower levels of educational attainment and lifetime earnings.

Absenteeism

Absenteeism remains a significant problem for employers and the economy given its deleterious impact on productivity and production. In the simplest sense it is a pattern of absence. The evidence base suggests that both deafness, and hearing loss more broadly are associated with nominally higher rates of absenteeism and has a significant impact on rates of absenteeism. The elevated rates of absenteeism are plausibly attributable to the lack of culturally viable supports overed within many organisational settings, and the calibration of office environments to the needs of the hearing. Elevated health support needs may also be plausible drivers.

Employing median salary data, and absenteeism estimates exploring absenteeism amongst Deaf and Hard of hearing communities, we are able to derive estimates.

The total annual cost of absenteeism due to hearing loss is $9,905,071

Presenteeism

In addition to absenteeism, presenteeism has implications for performance and productivity. It is the process of individuals working even if they are unwell or impacted by a condition(s). Several studies have explored presenteeism within deaf communities; rates of presenteeism are higher amongst deaf and hard of hearing staff than their hearing peers. The costs of presenteeism are significant, but it is important to understand the plausible causation for the differentials, likely attribution to entrenched disadvantages, a lack of culturally appropriate supports. The costs of presenteeism are asserted to be greater than the costs of absenteeism. **The total annual cost of presenteeism due to hearing loss is $19,316,431.**

Education services and intervention

Given the dearth of recent data on CHI costs and state level expenditure on education services we are reliant upon legacy estimates of cost established by KPMG (2010), Access Economics (2006), Deloitte Access Economics (2014) and PwC (2019). These cost estimates appear sound, and with appropriate inflationary adjustments reasonable estimates of overall costs of educational service delivery.

Early intervention and screening

There is presently limited data available pertaining to early intervention and screening costs. Much of the expenditure occurs at a state level beyond the national screen initiative. Consequently, we do not assign a cost item to this category of cost, noting that given the established costs of pathology, estimates would suggest that the cost would equate to $37,500,000 – $70,000,000. The apportionment of costs to deafness specific disorders is challenging given that the costs of screening are incurred concurrently. This cost item is low given the obvious benefits to risk identification, early treatment and intervention and developmental outcomes.

Primary and secondary education and support

The costs of primary and secondary educational support for deaf and hard of hearing children are difficult to establish given that such supports are both state and federally funded. Deloitte (2016) derives a useful set of initial estimates from state-based funding data, and employee counts. This novel approach enables the construction of a per student cost ratio. Employing the per student cost ratio and general inflation data enables the estimation of a cost-of-service figure at a per student level. Employing forecasts of prevalence, we are able to establish an annual cost of service delivery. **The estimated annual cost of primary and secondary school support for children with hearing loss is $429,417,000.**

Auslan Interpreter education

Data supplied by NAATI suggest that there are presently 699 registered Auslan interpreters, with current certification. Each interpreter invests significantly in their education with the cost varying between $4,750 and $6,500 dollars (RMIT, 2020, Deaf Connect, 2020) generally to complete a tertiary qualification prior to pursuing certification or to advance their knowledge and understanding. The current estimate employs DESE data and the average cost of the diploma designation. Subsidisation and fee assistance varies depending on the jurisdiction. **The total cost of Auslan interpreter education (tertiary) is $993,833.**

Auslan interpreter services

Research conducted by Orima (2003) and Deloitte (2006, 2016) is instructive in the analysis of interpreter services. It is estimates that approximately 86% of professional services accessed by the Auslan community required an interpreter. There are an estimated 334,821 interpreter hours to be performed in 2022 based on legacy estimates. To determine the current interpreter hours performed we inflate the legacy value by the rate of change in the number of interpreters our proxy for service demand. **The total cost of Auslan interpreter services in 2020 dollars is $36,328,100.**

Costs of dedicated professional services and communications services

The provision of key services is critical to promoting civic access and social engagement for Deaf and hard of hearing people. These include dedicated telephony services and facilitated professional service supports. The following segment outlines these costs as well as service deficits and opportunity costs.

Telecommunications services

The National Relay Service (NRS) is an important communications service for people who are deaf or have a hearing or speech impairment. The service relays calls made from a range of devices through a relay officer in situations where assistance with a voice call is required (Department of Communications, 2019). Advances in technology have seen a range of alternative communication options become available for NRS users. However, the service is still relied upon by many. **The funding allocated to the private provider of the national relay service is $22 million annually.**

Disability support for individuals with hearing loss

There are challenges associated with establishing the extent of disability support provided to individuals with hearing loss given the limited data available establishing the benefits extended to individuals. A report authored by Deloitte incorporates estimates procured through a direct data request to the DSS. This provides a baseline cohort count and cost model for estimation. However, the structure and nature of the funding model has changed in recent years, though it is predicted that the benefits provided through the NDIA and current employment benefits supports would be greater under the current model. A further challenge pertains to the determination of co-morbidities. Consequently, we employ the initial estimate set provided by Deloitte (2017) (noting that the estimate controls for co-morbidities, with FOI datasets supplied by the DSS) and account for inflation, and the size of the Deaf community. **The cost of providing disability support to individuals impacted by hearing loss is $19,342,370.**

Cost of Familial and Carer supports

There are a significant number of costs associated with hearing loss that are borne by the families and carers of individuals impacted by hearing loss. These costs pertain to the cost associated with the provision of care, noting that while the provision of care may be gratis, it is not free in the economic sense. Individual providing care are forgoing income generating activities and or leisure activities, and therefore there is an opportunity cost involved. Where individuals are pre-lingually deaf the costs and impacts are likely to differ from those that are post-lingually deaf. Accurately capturing these costs is genuinely challenging given the dearth of data exploring these associations. Again, absent of data carried by the relevant agencies, estimation remains challenging. We employ a reliable estimate provided by Deloitte and adjust the estimate to account for demographic change. **The (opportunity) cost of providing Familial and Carer support is $3,468,344.**

Cost of deafness to quality of life

To determine the overall impact of deafness and hearing loss on quality of life we employ a DALY approach. The impact of disability on life quality has been examined within a number of disciplines. Examining the economic benefit of any intervention on an ability set requires the use of a quality-of-life measure. We employ the methodology established by Murray (1990) and WorldBank (1993), to determine the economic benefit of Auslan, specifically a measure of lost health and wellbeing, and the associated gains from Auslan usage. The initial estimates of DALY values are based on disability weights supplied by the Global Disease Burden of Disability Study (GBD 2019).

We employ ABS data and the initial prevalence forecast distributions provided by Deloitte (2016) to determine estimates of hearing loss prevalence. We then determine the DALY value of hearing loss for each age cohort and aggregate the DALY estimates. We employ the Treasury department estimate on the statistical value of life, and DALYs totals to estimate the cost of deafness and hearing loss overall.

The total cost of deafness to wellbeing and quality of life is 1.052 – 1.358 billion dollars employing a DALY approach.

Additional plausible cost impacts

The following items are likely drivers of costs associated with hearing loss. Given the limited literature exploring these items, and the lack of data required to derive elasticities, we include them as discussion items, but do not ascribe a specific cost, for conservatism. Further research is needed to explore the implications of each of these plausible cost determinants.

Mental health service increases costs

It is asserted that mental health costs may be greater for individuals that are Deaf or hard of hearing (Glickman, 2020), and the impact may be greatest where there is significant language deprivation. The extent of the divergence is yet to be established. The costs associated with additional mental health services access and usage are not well established. Therefore, we have not included any additional cost items to reflect these differences.

Additional costs of care while aging

The evidence base pertaining to the association between aging and elevated costs of care is somewhat inconclusive. Where care is already provided within an aged care setting, it remains uncertain as to the extent of elevated cost of service associated with deafness. Consequently, while there is likely to be an elevated level of cost associated with service delivery further research is required to establish the extent of this cost. We have not included a cost allocation to this cost item.

Potential association between hearing loss and crime victimisation

Individuals with disabilities are more frequently the victims of crime. The elderly who evidence hearing loss are particularly susceptible. Hearing loss, poor eyesight, chronic and debilitating physical condition, and isolation are listed as factors which make older persons vulnerable to crimes (Lanzikos, 1985). Children that have not had their language needs met are more likely to be subjected to abuse, and to be reliant on social service support than those that receive such language support (Sullivan & Knutson 2000, Knutson et al. 2004, Kvam 2004).

While the evidence base strongly supports the association between deafness/hearing loss and crime victimisation, it remains somewhat challenging to quantify the extent to which victimisation increases with hearing loss within the existing research. Therefore, we do not assign a cost to this category of impact, notwithstanding the plausible cost. We acknowledge the significant need for further research into the impact of victimisation on the Deaf community, and its psychosocial, psychological and economic impacts.

Potential association between hearing loss and dementia

There is an emerging evidence base that suggests that hearing loss may be the most significant factor associated with dementia during middle age, that presents some scope for moderation. The research suggests that there is strong association between dementia prevalence and hearing loss, and this evidence indicates that few factors are directly influenceable beyond hearing loss. This evidence base remains inconclusive. Should a formal association between hearing loss and dementia be established the costs of hearing loss will greatly exceed those presented herein. For further research exploring this association see inter alia; Lin et al. (2011, 2014), Griffiths et al. (2020), and notably, Livingston et al. (2020).

Total costs of deafness and hearing loss

The overall costs of deafness and hearing loss are significant and span several categories. The most significant costs are associated with the impact of deafness and hearing loss on economic productivity, and on the quality of life of those directly impacted by deafness and hearing loss.

Cost Item	Cost – Deaf Community
Cost of separation	300,807.57
Outpatient exp.	182,595.61
Cochlear implantation	91,764,417.00
Implant maintenance	30,824,000.00
Hearing support Program	4,227,398.01
Hearing aid replacement	917,993.36
Maintenance of hearing aids	64,431.19
Hearing aid fitting refitting and consultation	172,357.59
GP Consultations	441,876.91
Allied Health	674,404.89
Additional health services	1,703,326.24
Reduced employment	75,931,265.79
Absenteeism	9,905,071.26
Presenteeism	19,316,431.80
Primary and secondary support	429,417,000.00
Auslan Interpreter education	998,833.00
Auslan interpreter services	36,328,100.00
National Relay Service	22,000,000.00
Disability support for individuals with hearing loss	1,942,370.75
Carer and support costs	3,468,344.27
Costs to wellbeing and quality of life	1,052,000,000.00
Total	**1,782,581,025.24**

The overall cost of deafness equates to approximately $1.784 billion. These costs evidence the significant need for policies and programmatic activities that redress these significant costs.

Conclusions

The costs of deafness and hearing loss are significant and extend well beyond the earliest stages of life. A significant number of factors that impact these costs are directly controllable or moderated by considered policy. Notably, the impacts of deafness and hearing loss may be reduced through appropriate intervention.

As noted in our report titled “The benefits of Auslan in early intervention approaches for deaf children” the economic benefits of quality early intervention are significant and yield long term benefits to both the child and society. The lifetime benefits to children and their families are significant, and strongly supported by the prevailing literature exploring intervention effects.

The benefits of greater investment in suitable interventions, including strategies emphasising the benefits of bimodal bilingualism given the established benefits of such approaches, is strongly justified given the psychosocial, developmental, and broader communal benefits to the child and the economic benefits associated with such interventions. The costs of delayed intervention, and underinvestment in the language foundation of children and young people are too significant to ignore.

Ensuring that intervention strategies that reduce these significant costs are not presented as diametrically opposed positions is essential. Ensuring that a tailored support model is enacted, rather than a one-size -fits-all approach is employed is critical. The proposed expansion of the newborn screening program is welcomed given its apparent benefits. Affording children appropriate interventions, including critical early life language interventions for deaf children, is critical.

The most critical consideration for pre-lingually deaf children are the establishment of a sound language foundation, affording sufficient funding to early intervention programs that acknowledge the benefits of adequate language foundations. Where children are afforded these benefits at the earliest opportunity, they are given the best chance to achieve age-appropriate developmental progress. Considered social policy must acknowledge that such interventions where possible should be afforded to children and parents, where possible from the time of birth, rather than when developmental delays arise.

Appendix 1 – Estimates of selected direct health expenditures

Wherever possible explanatory notes pertaining to the specific methods employed for estimation have been included within the text of the report or the footnotes. Where such presentation was implausible explanatory notes or further details pertaining to the estimates are included here.

Several key estimates derive from Per Capita earlier commissioned reports, specifically Our Culture Our Value: The Economic Benefits of Auslan, and The benefits of early Auslan intervention for deaf children.

The studies may be found at www.deafconnect.org.au/research please refer to Appendix 1.

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