

Hearing loss and hearing service experiences among older Māori and whānau: a scoping review

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ABSTRACT

AIM: Older Māori have higher rates of self-reported disabling hearing loss in Aotearoa New Zealand (NZ). However, have greater unmet need for special equipment than non-Māori. This review aims to analyse current literature on the experiences of hearing loss and hearing services among older Māori and whānau.

METHOD: This scoping review was undertaken using a Kaupapa Māori approach and PRISMA guidelines. Databases were explored to identify literature focused on older Māori and whānau experiences of hearing loss and hearing services. Inclusion criteria included: literature set in the NZ context; published between 1985 and 2020; English language; focus on hard-of-hearing Māori and whānau experiencing sensorineural hearing loss.

RESULTS: A total of eight sources were identified. Hearing loss is a detriment to daily functioning, partaking in conversations and retaining Māori culture. Cost and poor patient-provider interactions created barriers to hearing services for Māori with hearing loss and whānau.

CONCLUSION: The last analysis of literature regarding hearing loss and hearing services for Māori was written in 1989. Inequities in hearing loss and access to hearing services remain. Research that is Māori-led and uses a Kaupapa Māori approach is needed to further understand the realities of hearing loss and hearing services for older Māori and whānau.

Hearing loss is a critical public health concern for older Māori. Based on the 2013 census, 32% of Māori aged 65 years and over reported experiencing hearing loss, compared with 28% of the total 65+ Aotearoa New Zealand (NZ) population.¹ Despite having higher rates of 'self-reported' hearing loss, Māori have more unmet need for special equipment (30.4%) in comparison to older non-Māori (17.4%).¹ This is concerning, with evidence revealing an increased risk of accelerated cognitive decline in older adults with untreated hearing loss.²

The last report to the NZ government concerning hearing loss among Māori, *Whakarongo Mai*, was documented in 1989.³ To reduce the high level of hearing loss among Māori adults, the *Whakarongo Mai* Review Team (the Review Team) recommended routine collection of ethnic-specific diagnosed hearing loss data, appointment of a senior Māori Hearing Officer, coor-

dination between government agencies, further subsidy for adult hearing aids and the building of hearing services through active Māori participation. Over thirty years later, these recommendations are yet to be actioned.

Many older Māori have extensive roles and functions in society. It is within these roles as well as relationality that older Māori find reciprocal involvement both demanding and rewarding.⁴ However, hearing loss may impede Indigenous elders' communication abilities that are required to be involved. In 2002, for example, Castleden,⁵ a non-Indigenous Canadian researcher, reported that hearing loss among Echuse elders limited their capacity to share knowledge through traditional oral histories. Addressing gaps in accessibility to hearing services and information may be required to help hard-of-hearing older Māori maintain culture, local knowledge and quality relationships

with whānau (immediate and extended family network) and communities.

This scoping review sought to synthesise knowledge on older Māori and whānau experiences of hearing loss and hearing services within the NZ context and identify knowledge gaps for future research. The literature will be analysed through a Kaupapa Māori lens, a critical approach to sharing whose reality is being reported and by whom. The findings will be used to guide Kaupapa Māori research on hearing loss and hearing services among older Māori and whānau.

Positioning

This study was informed through a Kaupapa Māori positioning. According to Linda Tuhiwai Smith,⁶ researchers should be involved in retrieving spaces for Māori voices and perspectives in which Māori realities are seen as legitimate and transformation occurs. This is what underpins Kaupapa Māori.

Curtis⁷ articulates a set of key principles that Kaupapa Māori research should consider to be effective. That is, Kaupapa Māori research should have transformative meaning for Māori; be beneficial to Māori; be under Māori control; be informed by mātauranga Māori (Māori knowledge systems); be accepting of multiple Māori realities; align with a structural determinants approach to critique issues of power, privilege and racism; support social justice and decolonisation; and be non-victim blaming and reject cultural-deficit theories.

Methods

The PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews) checklist⁸ (Appendix Table 1) was adopted to ensure thorough selection, reporting and mapping of literature. Two search strings using key words and Boolean logic were developed to find literature on older Māori and whānau experiences of (1) hearing loss and (2) hearing services:

- (“hearing health” OR “hearing loss” OR “hearing impairment” OR “hearing disability” OR “hard-of-hearing”) AND (M?ori OR wh?nau OR kaum?tua OR kuia OR elders);

- (“hearing servic*” OR “hearing care” OR audiolog*) AND (M?ori OR wh?nau OR kaum?tua OR kuia OR elders).

(The * and ? symbols are wildcards for alternate word endings and replacing characters respectively (eg, ‘wh?nau’ was used for ‘whanau’ and ‘whānau’).)

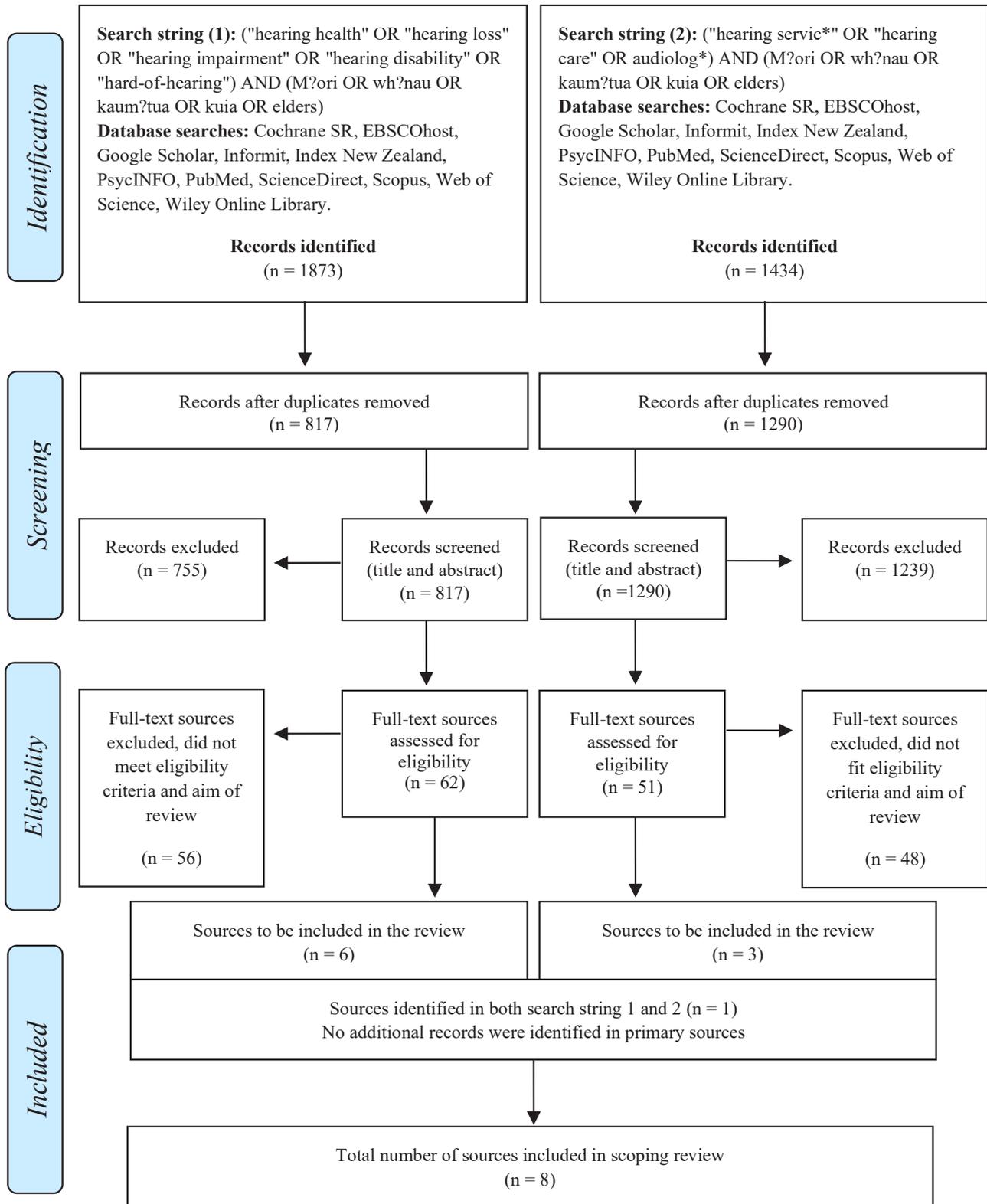
AM identified records through database searching: Cochrane SR, EBSCOhost, Google Scholar, Informit, Index New Zealand, PsycINFO, PubMed, ScienceDirect, Scopus, Web of Science and Wiley Online Library. Duplicate records were removed and the remaining records were screened. Non-English papers and irrelevant research topics were excluded. The final full-text sources were selected for analysis if they addressed the aim in question and fit the inclusion criteria: set within the NZ context; articles, book chapters and grey literature published between January 1985 and June 2020; and sensorineural hearing loss and hearing service experiences of hard-of-hearing Māori and whānau of Māori with sensorineural hearing loss across all ages.

Both GS and EC reviewed the content credibility of the final literature identified. Data charting (a data extraction process in a scoping review) was used to extract information from the literature. The data on study characteristics (eg, author, year of publication, type of publication and study aim), population characteristics and key findings (eg, methods and methodology used and experiences of hearing loss and hearing services) were extracted, tabulated and summarised narratively.

Results

The search process is illustrated through a PRISMA flow diagram (Figure 1).⁹ A total of eight primary sources were considered eligible for this review. These included: five articles, a conference abstract, a government report and a Master of Audiology thesis. All sources presented information on experiences of hearing loss among Māori.^{3,10-16} Two sources provided information on experiences of hearing services among hard-of-hearing Māori.^{3,15} Only one source discussed whānau experiences of hearing loss and hearing services across NZ.¹⁶ See Appendix Table 2 for a summary of the literature.

Figure 1: Modified PRISMA flow diagram of the literature search.



There is a paucity of research concerning older Māori and whānau experiences of hearing loss and hearing services within NZ. Although there were small fragments on the experiences of hearing loss and/or hearing services among Māori in each of the sources, zero sources had a sole focus on hearing loss and hearing service experiences among older Māori and their whānau.

Four main themes emerged from the literature:

1. Hearing loss disrupts day-to-day functioning.
2. Māori and whānau impacted by hearing loss are at a disadvantage.
3. Hearing healthcare is unaffordable.
4. Support of hearing healthcare professionals and other key players is essential.

Hearing loss disrupts daily activities

Older Māori experiences of hearing loss were identified in four sources. In 2011, Dyall et al¹⁰ recruited a total of 33 kaumātua (Māori elders) aged 75–79 years in the Bay of Plenty and Lakes districts for a feasibility study. They investigated whether Māori of advanced age would be interested, and able to take part, in a questionnaire and assessments involving vision and hearing screening. The study found that 16% of participants reported hearing loss as being disruptive to their daily activities.

The feasibility study led to *Life and Living in Advanced Age, a cohort study in New Zealand (LiLACS NZ)*.¹¹ Kaupapa Māori methods were adopted in the initial stages of engaging with and recruiting participants. Authors of the study¹¹ did not clarify whether the LiLACS NZ study was grounded in Kaupapa Māori methodology. A total of 421 Māori aged 80–90 years, and 516 non-Māori aged 85 years, were recruited at baseline. A third of Māori participants reported having significant hearing loss that interfered with their day-to-day functioning (31%; 38% for men and 26% for women), which is greater than that reported by non-Māori participants (26%; 32% for men and 21% for women).

More recently, McAuliffe, Schluter and Jamieson's 2018 cross-sectional study investigated the prevalence and extent of communication disability in NZ.¹² From a

total of 71,859 adults aged ≥65 years (89.2% European/other; 5.4% Māori; 3.1% Pasifika; and 2.3% Asian), 30.6% of participants exhibited at least some expression disability, and 36.2% stated having at least some difficulties with comprehension. McAuliffe and colleagues also noted that Māori, Pasifika and Asian peoples, males and those who were older were more likely to experience expressive or comprehension disability, in comparison to their European/other, female and younger counterparts. Gender differences may be owed to faster hearing decline among males¹² and the over-representation of Māori men in many industries where noise exposure is higher.¹⁷

Zhang et al's¹³ cross-sectional study investigated the associations between sensory-related disability and quality of life. Table 1 in their study presents prevalence data of self-reported hearing and vision difficulties against age, sex, ethnicity and level of education. The results revealed 17% (29/170) of Māori and 21% (740/3,547) of non-Māori expressed having moderate-severe hearing difficulties with daily tasks.

We interpreted Zhang et al's¹³ results with caution. Although they had access to such data, the researchers did not delve into the relationships between these factors. As an example, the degree of hearing difficulty experienced by Māori men and/or women aged between 61 and 79 was not available. Age-specific data for each ethnicity could be useful in understanding Māori hearing health outcomes and the distribution of and access to resources. Although McAuliffe and colleagues¹² provided representative data for older Māori aged 65 years and above, Zhang et al¹³ did not provide a representative sample size of NZ's Māori resident population—Māori participation in the Zhang et al study (4.6%) fell short of the 6.5% of Māori aged above 60 years in the 2013 census data.¹⁸ Inaccurate estimations can be problematic as poor Māori representation in research can create inequitable distribution of resources and inequitable health outcomes.¹⁹

Hearing loss creates disadvantages

Four studies highlighted several disadvantages that Māori experience due to hearing loss. Perkins and Coombes presented their research at the 2006 Conference of the Australian and New Zealand Psychological Societies.¹⁴ The qualitative study

documented how hearing loss impacts the lives of Māori women via a focus group of seven Māori women (no specified ages). Participants reported feeling isolated with a hearing loss and consequently withdrew from activities important for cultural identity, including conversations, learning te reo Māori (Māori language) and participation in cultural events.

Drawbacks were also discussed in Williams' viewpoint article.¹⁵ The Kaupapa Māori researcher discussed her experience as a woman with severe-to-profound hearing loss and its impacts on her various daily roles and functions in society. Williams stated having difficulties with undertaking work that relies on oral methods of communication and function, participating in te reo Māori classes, keeping safe and attending meetings, conferences and events.

Whānau of hard-of-hearing Māori children also expressed their concerns that hearing loss creates personal, social and cultural disadvantages for their children.¹⁶ Māori audiologist Aroha Crisp interviewed 12 Māori whānau from five different areas within NZ (Auckland, Huntly, Tokoroa, Rotorua and Napier).¹⁶ Whānau reported hearing as an important sense to have so their children can access their Māori culture through learning Māori tikanga and interacting with people in te reo Māori. From the voices of whānau: opportunities for hard-of-hearing children to actively participate in Māori society are necessary.¹⁶

In the *Whakarongo Mai* report, very few accounts of hearing loss among Māori adults were shared.³ Of those reported, hearing loss impacted on the conditions of daily life and access to socioeconomic determinants. More specifically, untreated loss contributed to poor educational achievement, difficulties adjusting to societal demands, low incomes, job instability and high rates of unemployment.

Cost of hearing services and technology

Out-of-pocket expenses, including consultation costs, fitting services, travel costs, hearing aid batteries and repairs, were reported as a barrier to hearing services for hard-of-hearing Māori^{3,15} and whānau.¹⁶ The national subsidy for hearing aids was introduced in 1947 and covered the full cost

of a hearing aid and earmould. In the 1980s, the hearing aid subsidy of \$89.10 covered 15–20% of the total cost of a hearing aid, so for many elderly people aids were well beyond their resources.³ The *Whakarongo Mai* Review Team³ commented that the subsidy “barely covers the cost of the visit to the Ear, Nose and Throat consultant necessary to claim the subsidy” (p.41). Consequently, many older Māori were left with little option but to endure their hearing loss.³

Two decades later, the cost of technology and services remain unaffordable for hard-of-hearing Māori. Williams¹⁵ stated affordability of a cochlear implant for many adults is marginal and eligible recipients are on average expected to wait 2–6 years. Strict eligibility criteria, financial barriers, location of audiology clinics and transportation to and from appointments were several challenges whānau experienced from getting a diagnosis or rehabilitation for their child's hearing loss.¹⁶

Relationships in hearing healthcare

Little is known about the interactions and relationships between Māori and hearing healthcare professionals. Crisp¹⁶ further explored this space and found the majority of whānau relied on their audiologist to provide them with information on hearing loss, treatment, communication and educational options. However, a number of whānau reported that their audiologist would dismiss their observations without follow-up, attribute their child's unresponsiveness to factors other than a hearing loss and not explain all viable hearing technology options. Whānau also had to proactively ask the audiologist about other options (eg, cochlear implants) for their children.

Other key persons have assisted in navigating hearing services. Whānau reported Advisors on Deaf Children (AoDC), and other families who have been through similar experiences, as useful in making decisions about their child's journey. Very few Māori parents met up with other parents; those who did meet with other parents found it to be beneficial and assuring.

Discussion

In this review, we aimed to explore and analyse current evidence on the experiences of hearing loss and hearing services among

older Māori and whānau. Only eight sources were eligible for analysis.

In summary, hearing loss has held back the lives of many older Māori. Hard-of-hearing Māori and whānau have reported difficulties with gaining control over the circumstances necessary for their health, wellbeing and cultural identity. Because access to hearing services and technology is limited by factors such as cost and poor relationships with hearing healthcare professionals, hard-of-hearing Māori and whānau may need more support along their hearing healthcare journeys. To date, no researchers have specifically focused on hearing loss and hearing service experiences among older Māori and whānau in NZ. This illustrates the paucity of research and information in this area, especially the lack of Māori-led research and research using a Kaupapa Māori philosophy that re-centers Māori ways of being, doing and knowing. This is a public health concern for older Māori, and given the number of older Māori aged 60 years and over is projected to increase from 7.4% in 2018 to 10.2% in 2038,¹⁸ there is a need for Kaupapa Māori research in this area.

Hearing loss limitations

Issues with hearing loss and access to services have particular implications for Māori, as theirs is an oral-based society. Untreated hearing loss disadvantages Māori in building and maintaining te reo Māori and in their connections with all things—connections and relationships deemed by hard-of-hearing Māori and whānau as vital for cultural identity.^{15,16}

Hearing loss restricts access to the built environment, housing to education and healthcare (ie, the social determinants of health).³ This—alongside their loss of land, displacement from their homes and disruptions to Māori culture—restricts older Māori with hearing loss from reconnecting to and relearning their roots.³ Consequently, Māori with untreated hearing loss may be more likely to experience significant disparities in health and wellbeing than their non-Māori counterparts.

The consequences of hearing loss are likely to extend beyond the individual to whānau, who may have limited resources and capacity to provide necessary support.

Currently, no evidence is available for us to understand whānau experiences of older Māori living with hearing loss. It is likely that whānau of hard-of-hearing Māori adults are suffering from a ‘third-party disability’. That is, family members are likely to experience participation restrictions and activity limitations as a result of the health condition of a family member or significant other.^{20–21}

A third-party disability was identified among spouses of older adults with hearing loss in Australia.²¹ Using the International Classification of Functioning, Disability and Health (ICF) framework, Scarinci, Worrall and Hickson²¹ found that spouses experience a range of activity limitations and participation restrictions due to their partner’s hearing loss. If whānau are also impacted by hearing loss, increasing whānau engagement in hearing services should also be recommended.

Many allied health professionals utilise the ICF framework, but it has its drawbacks in explaining Indigenous experiences of disability.²² Hollinsworth argues that, by overlooking ancestral connectivity, community collectivity and the impacts of colonisation and institutional racism, the ICF framework ignores cultural context as a significant aspect of health and wellbeing of Indigenous peoples by overlooking ancestral connectivity, community collectivity, and impacts of colonisation and institutional racism on Indigenous peoples.²² Due to the diverse Indigenous contexts, realities and understandings of disability, the use of the ICF framework for explaining Māori and whānau realities of hearing loss may need to be reconsidered. Without re-evaluation of current frameworks, the status quo is maintained and may lead to further oppression of Māori with hearing loss.

Service provision barriers

Māori and whānau have voiced their concerns around the cost of hearing services and hearing technology and the limited access to funding.^{3,15–16} While entitlements to disability support services and other state support exist, they are not often utilised by older Māori, because the support and funding systems are complex and difficult to understand.²³ Cunningham and colleagues²³ recommend transforming these systems with older Māori engagement for better utilisation of funds and support services.

Other factors, such as poor health literacy, systemic racism and discrimination, have impacted on Māori hearing healthcare provision and outcomes.^{3,24} Whānau in Crisp's study often faced cost barriers and felt they were not being listened to by their professional.¹⁶ It is possible the latter barrier could be in part due to the under-representation of Māori hearing healthcare professionals, a lack of cultural safety practice standards for NZ hearing healthcare professionals²⁵ and systemic racism and power imbalance in hearing healthcare, which has been reported in research overseas.²⁶

The proportion of Māori audiologists (kaimātai ororongo) at 2% and audiometrists (kaimātau ororongo) at 0% is not representative of NZ's resident population.²⁵ Ethnic statistics of NZ's hearing therapists are yet to be published. The low representation of Māori in the hearing healthcare workforce could halt the profession from moving forward, particularly in a context where resources are already scarce for those who need it the most. To achieve success for Māori health- and disability-workforce development, researchers highlight the importance of incorporating a comprehensive pipeline or pathway model (from secondary to postgraduate education) that is framed from within Indigenous world-views and addresses barriers to Indigenous student engagement.^{27,28}

With the shortage of Māori in the hearing healthcare workforce, the vast majority of interactions hard-of-hearing Māori and whānau have are with non-Māori hearing healthcare professionals. Jansen et al²⁴ stated that problems can arise when non-Māori staff have attitudes and perceptions to healthcare delivery that do not reflect Māori realities and cultural values. Cumulative effects of prejudice and injustice have harmful impacts on the quality of people's lives, health and ageing. They deflect the responsibility of health professionals, hide power relations and reduce the visibility of Pākehā privilege²⁹—“a preferential benefit accrued by Pākehā from the systems they introduced and built and continue to redefine and control.”²⁹(p.5) Culturally safe practice has the potential to expand into the hearing healthcare profession, where healthcare professionals recognise they are bearers of their own culture and attitudes

and that their power can be transferred to their patient/client to establish trust.³⁰

Education and support should not conclude in the clinical setting. Community support networks have been identified as beneficial for some Māori parents¹⁶ and may prove useful in older Māori and their whānau hearing healthcare journeys. An increased emphasis on community connections may also mean community-based support resources dedicated to hearing loss, technology and services are required.

Strengths and limitations

This review is the first Māori-led analysis of literature on hearing loss and hearing service issues for Māori since the 1980s. Strict inclusion criteria focusing on Māori limited the number of resources available for examination. However, this reflects the dearth of literature, even when grey literature is included. Although inclusion of grey literature presents potential challenges, such as the quality of information, it has provided more context to the research question being examined, especially with the limited state of peer-reviewed articles. Thorough PRISMA-ScR report processes were used and literature were critically evaluated through a Kaupapa Māori lens, which we believe are noted strengths of this review.

Conclusion

Hearing loss remains a public health concern for older Māori and whānau. The findings from this literature review are concerning. Across generations, Māori have been suffering from untreated hearing loss with debilitating outcomes on health and wellbeing. This review highlights the limited availability of evidence on the experiences of hearing loss and hearing services among Māori adults and whānau. Māori-led research that sits within a Kaupapa Māori framework is needed to better understand and inform policy relating to the lived experiences of hearing loss and hearing services among older Māori and whānau.

Funding

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Appendix

Appendix Table 1: PRISMA-ScR Checklist.⁹

Section	Item	PRISMA-ScR checklist item	Section reported
Title	1	Identify the report as a scoping review.	Title
Structured summary	2	Provide a structured summary that includes (as applicable) background, objectives, eligibility criteria, sources of evidence, charting methods, results and conclusions that relate to the review questions and objectives.	Abstract
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	Introduction
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (eg, population or participants, concepts and context) or other relevant key elements used to conceptualise the review questions and/or objectives.	Introduction
Protocol and registration	5	Indicate whether a review protocol exists; state whether and where it can be accessed (eg, a web address); and if available, provide registration information, including the registration number.	N/A
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (eg, years considered, language and publication status), and provide a rationale.	Methods
Information sources*	7	Describe all information sources in the search (eg, databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	Methods
Search	8	Present the full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	Methods
Selection and sources of evidence†	9	State the process for selecting sources of evidence (ie, screening and eligibility) included in the scoping review.	Methods
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (eg, calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	Methods
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	Methods
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	N/A
Synthesis of results	13	Describe the methods of handling and summarising the data that were charted.	Methods
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	Results, Figure 1

Appendix Table 1: PRISMA-ScR Checklist (continued).⁹

Section	Item	PRISMA-ScR checklist item	Section reported
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	Results, Appendix Table 2
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	N/A
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	Appendix Table 2
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	Results
Summary of evidence	19	Summarise the main results (including an overview of concepts, themes and types of evidence available), link to the review questions and objectives and consider the relevance to key groups.	Discussion
Limitations	20	Discuss the limitations of the scoping review process.	Discussion
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	Conclusion
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	Funding

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews.

* Where *sources of evidence* are compiled from, such as bibliographic databases, social media platforms, and websites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (eg, quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources*.

‡ The frameworks by Arksey and O'Malley and Levac and colleagues and the JBI guidance refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (eg, quantitative and/or qualitative research, expert opinion and policy documents).

Appendix Table 2: Literature review summary.

Author; Year. ^{REF}	SS1* / SS2*	Type	Aim	Population	Methodology and methods	Key findings
The Review Team; 1989. ³	SS2*	Report	To advise the Minister of Māori Affairs on the most appropriate means to achieve the needs of Māori people in policy planning and service delivery for the hearing impaired.	Māori population in New Zealand (NZ) with a focus on Māori children.	The report <i>Whakarongo Mai</i> was written in both English and Māori comprising of eight sections. The written report was prepared for the Minister of Māori affairs and reported to the Minister in August 1989. The first meeting of inquiry was held in March 1989. The report was informed through publications, discussions with members of the D/deaf community, representatives of organisations, government departments and Māori community groups, and through written submissions.	Hearing loss is creating personal and social disadvantage. Those experiencing hearing loss are often without access to their own heritage with reduced opportunities to actively participate in society as a whole, or Māori social and cultural life in particular. Thus, hearing-impaired adults can become isolated and severely disabled if they do not have access to social, technical, education and cultural facilities. Cost of services and hearing technology is high. Hearing disability imposes additional economic burdens such as consultant visit fees, hearing aids and earmoulds. The Review Team reported the cost of hearing aids have left many older Māori with little option but to suffer with their hearing impairment.
Dyall et al; 2011. ¹⁰	SS1*	Journal article	To investigate whether Māori of advanced age would be interested in and able to take part in a questionnaire and several assessments for the LiLACS NZ study.	A total of 33 Kaumātua (75–79 years old) living in the Bay of Plenty and Lakes district health board (DHB) areas were recruited.	Māori led feasibility study. Kaupapa Māori methods used for recruitment and kaitiaki group of Māori elders was formed to provide tikanga Māori support for methods used. No specific methodology mentioned. Interviewer-administered questionnaire and physical assessments were conducted.	Hearing loss was found to be disruptive for participants but less than vision. This study supported the development of the LiLACS NZ large cohort study.

Appendix Table 2: Literature review summary (continued).

Author; Year. ^{REF}	SS1* / SS2*	Type	Aim	Population	Methodology and methods	Key findings
Teh et al; 2014. ¹¹	SS1*	Journal article	To establish self-rated health, health-related behaviours and health conditions of Māori and non-Māori in advanced age.	Baseline data was obtained from 421 Māori (80–90 years old) and 516 non-Māori aged 85 years living in the Bay of Plenty and Rotorua districts.	Guidance sought from Māori oversight kaitiaki rūpu. Kaupapa Māori methods used for recruitment. No specific methodology mentioned. Within self-rated health, hearing disability was asked using a modified question from the 1989 Cognitive Function and Ageing Studies (CFAS I): ‘How much does your hearing interfere with your day-to-day functioning?’	A third of Māori participants had a significant hearing loss (31%; 38% for men and 26% for women). Statistically significant gender differences in hearing loss were identified between Māori men and Māori women (P-value = 0.011). Significant hearing loss was identified as less for non-Māori participants (26%; 32% for men and 21% for women). Statistically significant gender differences were noted between non-Māori men and women (P-value = 0.005), with more men suffering from hearing loss.
McAuliffe et al; 2019. ¹²	SS1*	Journal article	To profile the prevalence and extent of expressive and receptive communication disability associated with age, sex and ethnic groups through the database of Home Care International Residential Assessment Instrument (interRAI-HC) assessment between 1 September 2012 and 31 January 2016. It further aimed to determine whether Māori, Pasifika and Asian were disproportionately represented within these data.	Of the 72193 InterRAI-HC assessments done, 16 were repeat assessments and 318 had invalid encrypted National Health Index (NHI) numbers, leaving a number of 71,859 adults ≥65 years old (89.2% European/other; 5.4% Māori; 3.1% Pasifika; and 2.3% Asian eligible).	Non-Māori led cross-sectional study using national cohort data of older adults who underwent the standardised interRAI-HC. No specific methodology mentioned. Within interRAI-HC older adults were asked about their ability to make themselves understood (expression), and their ability to understand verbal content with hearing aid normally used (comprehension).	Communication disability was identified as common among older adults. It was found 30.6% participants exhibited at least some expression disability, and 36.2% stated having at least some difficulties with comprehension. Māori, Pasifika and Asian peoples, males and those who were older were more likely to experience at least some expressive or comprehension disability relative to their European/other, female and younger counterpart. The ethnic differences identified may reflect cultural differences in language and expression, or systemic differences in healthcare access or socioeconomic position. This is yet to be explored. Gender differences in communication could be due to hearing sensitivity.

Appendix Table 2: Literature review summary (continued).

Author; Year. ^{REF}	SS1* / SS2*	Type	Aim	Population	Methodology and methods	Key findings
Zhang et al; 2016. ¹³	SS1*	Journal article	To establish associations between sensory-related disability and quality of life (QOL) using the Brief Risk Identification of Geriatric Health Tool (BRIGHT) trial database.	A total of 3817 older adults (1,710 men, 2,081 women, 26 sex not identified) residing in the Bay of Plenty, Capital and Coast and Canterbury DHBs. Non-Māori aged 75 years and older were included in the study. Māori over 60 years of age were included in the study, in view of lower life expectancy.	Non-Māori led cross-sectional study analysing baseline data of the BRIGHT trial. Participants were asked about their health including hearing and vision difficulties through interviews, followed by a questionnaire posted out to participants. No specific methodology mentioned. Hearing difficulties were assessed as part of the interviewer-administered questionnaire: 'How well do you hear?' and 'Do you use a hearing aid at all?' to assess use of hearing aids.	Moderate-severe hearing difficulties with daily tasks were reported by 17% of Māori (29/170) and 21% of non-Māori (740/3,547). Minimal hearing difficulties were reported by 19% of Māori (33/170) compared to 22% of non-Māori (794/3,547) participants, while no difficulties with hearing were reported by 64% of Māori (108/170) and 57% of non-Māori participants (2013/2,547). Ethnic-specific gender rates were not available. In the study, 26% of participants (974/3,761) reported wearing hearing aids, with 64% reporting hearing difficulty using hearing aids and 35% not using hearing aids. In regards to these latter results, Zhang et al reported there was a miscommunication in asking participants to report difficulty with hearing aids on and as a result explained that their hearing difficulty results may have been overestimated among participants using hearing aids. Furthermore, Zhang et al did not discuss ethnic-specific hearing aid use data.
Perkins, V., & Coombes, L. 2006. ¹⁴	SS1*	Confer- ence abstract	To draw attention to some inadequacies of the experience of cultural identity and hearing loss for Māori women so they can be addressed.	Seven Māori women with hearing loss. No ages available.	Māori led qualitative study consisting of one focus group. No specific methodology mentioned.	Themes that emerged from the focus group were feelings of isolation and withdrawal due to hearing loss. This made it difficult for the participants to take part in culturally significant events. Language was also noted to be vital to their cultural identity however learning of te reo Māori was mentioned as challenging for participants.

Appendix Table 2: Literature review summary (continued).

Author; Year. ^{REF}	SS1* / SS2*	Type	Aim	Population	Methodology and methods	Key findings
Williams, L; 2019. ¹⁵	SS1* SS2*	Viewpoint article	To describe the author's direct experience as a person with severe-to-profound hearing loss.	Senior Māori researcher and social scientist in her 50s. Diagnosed with a progressive hearing loss 22 years prior while undertaking her PhD studies.	Māori self-case study. Used a Kaupapa Māori approach to research.	Difficulties with untreated hearing loss: having a telephone conversation, undertaking professional training that rely on oral methods of communication and function, participating fully in te reo Māori classes, facilitating qualitative research in the community, participating in virtual and face-to-face meetings with more than one person, explaining her deafness and communication strategies, attending work events and social events as they can be stressful, chairing a panel at research conferences and participating on boards, communicating with ease within her day-to-day living situation and keeping safe from moving vehicles. Affordability of cochlear implant/s for adults is unattainable. For those with severe-to-profound hearing loss who can afford generally elect to receive privately funded CIs.

Appendix Table 2: Literature review summary (continued).

Author; Year. ^{REF}	SS1* / SS2*	Type	Aim	Population	Methodology and methods	Key findings
Crisp A; 2010. ¹⁶	SS2*	Master's thesis	To examine the decisions Māori families make after the diagnosis of a hearing loss in the whānau.	Twelve Māori whānau from five areas within NZ (Auckland, Huntly, Tokoroa, Rotorua and Napier). These included seven mothers and one father with children who have hearing loss, two Māori men (50 and 63 years old) with hearing loss, and two Māori women (24 and 42 years old) with hearing loss.	Māori led research. No specific methodology mentioned. Participants were recruited through word of mouth and an advert sent to health professionals in the areas of audiology and advisors on deaf children. Semi-structured interviews were conducted. Families shared their experiences of hearing loss, searching for appropriate interventions and making choices regarding rehabilitation, communication and education.	All whānau interviewed communicated through English, six whānau utilised basic terms or fully immersed in te reo Māori and three whānau communicated through sign language at home. Majority of whānau expressed the importance of their child to know te reo Māori and some whānau expressed interest in communicating via sign-language. Māori whānau experienced much of the same difficulties in obtaining a diagnosis and hearing aids/cochlear implants as non-Māori families. Problems, however, are emphasised by socio-economic factors such as limited access to healthcare, transportation and location and financial issues. Many whānau relied solely on hearing health professionals to provide them with information. A number of the parents reported problems of professionals being dismissive of observations without follow-up or their child's unresponsiveness was due to other factors than hearing loss. Professionals also did not often discuss the option of cochlear implants but rather the parents themselves asked further into cochlear implants as an option for their child. Alternatively obtaining information from deaf adults and other families of deaf children was well received.

Competing interests:

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