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Vision impairment and differential use of eye health services by ethnicity in Aotearoa New Zealand: Protocol for a scoping review

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Vision impairment, vision screening, vision function, eye health, eye service, eye diseases, healthcare disparity, health equity, optometry, ophthalmology, Māori health, Pacific health, New Zealand

ABSTRACT

Introduction

In Aotearoa New Zealand, Māori and Pacific people experience worse health outcomes compared to other New Zealanders. No population-based eye health survey has been conducted, and eye health services do not generate routine monitoring reports, so the extent of eye health inequality is unknown. This information is required to plan equitable eye health services. Here we outline the protocol for a scoping review to report the nature and extent of the evidence reporting vision impairment, and the use of eye care services by ethnicity in New Zealand.

Methods and analysis

An information specialist will conduct searches on MEDLINE and Embase, with no limit on publication dates or language. We will search the grey literature via websites of relevant government and service provider agencies. Reference lists of included articles will be screened. Observational studies will be included if they report the prevalence of vision impairment, or any of the main causes (cataract, uncorrected refractive error, macular degeneration, glaucoma, or diabetic retinopathy), or report the use of eye care services in New Zealand among people of any age. Two authors will independently review titles, abstracts, and full text articles, and complete data extraction. Overall findings will be summarised using descriptive statistics and thematic analysis, with an emphasis on disaggregation by ethnicity where this information is available.

Ethics and dissemination

Ethical approval has not been sought as our review will only include published and publicly accessible data. We will publish the review in an open access peer reviewed journal. We anticipate the findings will be useful to organisations and providers in New Zealand responsible to plan and deliver eye care services, as well as stakeholders in other countries with differential access to eye care.

Registration details

The protocol has been registered with Open Science Framework: URL https://osf.io/yw7xb

Article summary

Strengths and limitations of this study

- The broad scope of this review will result in the first synthesis to date on the extent of the evidence on vision impairment, its main causes and use of eye care services across ethnicity groups in New Zealand.
- The search will be performed by an information specialist, and screening and data extraction will be performed in duplicate.
- We anticipate limited information on some causes of vision impairment, and inconsistent disaggregation of outcomes by ethnicity.

INTRODUCTION

Rationale

Globally, an estimated 43 million people were blind, and 295 million people had moderate or severe vision impairment in 2020.[1] In high-income countries, including Aotearoa New Zealand (hereafter referred to as New Zealand), the main causes of blindness and moderate or severe vision impairment (collectively referred to as vision impairment) are cataract, macular degeneration, glaucoma, uncorrected refractive error and diabetic retinopathy.[2] Most people with vision impairment are older adults, however diabetic retinopathy is the leading cause of vision impairment in the working age group.[3] Diabetic retinopathy is projected to be an increasingly common cause of vision impairment in the coming decades due to the rising prevalence of diabetes.[4]

Although some countries are striving to reduce health inequalities,[5] achieving equitable health outcomes is an intractable challenge.[6] In many countries, people who are Indigenous, living with socioeconomic disadvantage and marginalised communities face barriers to accessing health care.[7] Consequently, systemic and chronic health conditions are more prevalent among these people.[8] They also tend to have higher rates of vision impairment.[9, 10] For example, in Australia the prevalence of cataract is higher among Indigenous people, reflecting lower access to eye care compared to non-Indigenous Australians .[7, 11]

Māori, the Indigenous people of New Zealand, are one of six main ethnicity groups (defined by Statistics New Zealand as "a cultural group a person identifies with or has a sense of belonging to").[12] In the 2018 Census, 70% of New Zealanders identified with at least one European ethnicity, 17% identified as Māori, 8% identified with at least one Pacific peoples' ethnicity, 15% identified as Asian, 2% identified as Middle Eastern/Latin American/African and 1% identified as other ethnicity.[13]

Inequities in health, and ethnic variations in the prevalence of systemic diseases has been reported in New Zealand.[14] The health gap is persistent between Māori and non-Māori.[15] Chronic conditions such as diabetes, cardiovascular disease and chronic obstructive pulmonary disease are more prevalent among Māori compared to other New Zealanders.[16, 17] Māori also have a 25 fold need for renal replacement therapy[14] and a 30% higher risk of developing a cardiovascular event compared to European New Zealanders.[18]

Inequities in eye health are well-documented in several high-income countries.[11, 19, 20] In New Zealand the extent of inequity in eye health is largely unknown. New Zealand has never had a population-based eye health survey. A systematic review has been conducted on diabetic retinopathy prevalence and services,[21] but synthesis of information on other causes of vision impairment has not been undertaken. This information would assist decision-makers to plan equitable eye health services.

The aim of this scoping review is to summarise the nature and extent of evidence in New Zealand on:

1) The distribution of vision impairment and its major causes by ethnicity; and
2) Differential access to eye health services by ethnicity.

As there is no New Zealand-specific information available on the main causes of vision impairment, we will assess the evidence on main causes in high-income countries.[2] We chose to undertake a scoping review rather than a systematic review, as we anticipate that the available evidence will be heterogenous.[22]

METHODS AND ANALYSIS

Objectives/scoping review questions

We aim to answer the following questions:

1) What is the nature and extent of the available evidence on vision impairment in New Zealand?
2) What is the available evidence on the prevalence of the major causes of vision impairment in New Zealand?
3) How and in what ways is vision impairment and its major causes distributed across ethnicity groups?
4) What is the available evidence on differential access to eye health services for the major causes of vision impairment by ethnicity?

Protocol and registration

The protocol for this scoping review is reported according to the relevant items of the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) checklist (supplementary annex 1).[23] The protocol has been registered with Open Science Framework: URL https://osf.io/yw7xb.

Patient and public involvement

There are no patient or public involvement as our review will only include published and publicly accessible data.

Eligibility criteria

We will include studies that meet the following criteria:

Types of studies

Observational study types such as cross sectional, case control and consecutive case series will be included. Non-consecutive cases series will be excluded. Research letters and grey literature, such as District Health Board (DHB) reports will be included, if they report data for at least one of our outcomes of interest. Editorials and conference abstracts will be excluded. We will have no time limit or language restrictions; a full text must be available.

Outcomes

Studies will be included if they report outcomes among residents of New Zealand (whether disaggregated by ethnicity or not), or attendees at New Zealand health facilities (regardless of size, public/private sector, or level of care). There will be no age restriction. Multi-country studies will be included if the results are reported separately for New Zealand.

We will include studies that report at least one of:

- the prevalence of vision impairment;
- the prevalence of cataract, uncorrected refractive error, macular degeneration, glaucoma or diabetic retinopathy;
- the prevalence of vision impairment due to cataract, uncorrected refractive error, macular degeneration, glaucoma or diabetic retinopathy;
- attendance at eye health service such as ophthalmology services, optometric services, and eye health screening programmes (e.g., diabetic retinopathy, preschool screening);
- rates of treatment for cataract, uncorrected refractive error, macular degeneration, glaucoma, or diabetic retinopathy.

We will include studies which report these outcomes by person. Studies which only report the outcomes by eye or by eye health service visit will be excluded.

Search

Published literature search

We will search MEDLINE and Embase using search strategies developed by a Cochrane Eyes and Vision Information Specialist (IG). Our MEDLINE search strategy is included in supplementary annex 2. We will examine reference lists of all included articles to identify further potentially relevant studies.

Grey literature search

We will include grey literature that report data for at least one of our outcomes. Using Google search engine, separate searches will be performed across:

- New Zealand government websites such as Ministry of Health and district health boards;
- Professional associations such as New Zealand Association of Optometry (NZAO) and the Royal Australian and New Zealand College of Ophthalmologists (RANZCO);
- Non-profit organisations and charitable trusts such as Blind Low Vision New Zealand and Macular Degeneration New Zealand.

General search terms will be used to identify eligible information within each website. Relevant links within documents to other sources of information will be pursued. A single reviewer will perform the search and identify eligible data, with verification from a second reviewer.

Search terms will include:

- "vision", "eye", "eye health", "eye service", "vision tests" and "vision screening"
- "cataract", "uncorrected refractive error", "macular degeneration", "glaucoma" or "diabetic retinopathy".

Study selection

Covidence systematic review software will be used for screening (Veritas Health Innovation, Melbourne, Australia. Available at: www.covidence.org). Two reviewers will independently screen the title and abstract of identified studies to exclude publications that clearly do not meet the inclusion criteria. The full text article will be retrieved for review if the citation seems potentially relevant. Any discrepancies between the reviewers will be resolved by discussion and a third reviewer will be consulted if necessary. A PRISMA flow diagram will be completed to summarise the study selection process.

Data charting process

A custom form will be developed in Excel for data charting. The form will be piloted on three studies and required amendments agreed by consensus. As we anticipate a broad scope of studies, the data charting process will be iterative, and the data charting form will be amended as required. Each included study will be charted independently by two reviewers. Any discrepancies between the reviewers will be resolved by discussion, and a third reviewer will be consulted if necessary. We plan to contact study authors in the case of unclear information and will make up to three attempts by email.

Data items

The following data items will be collected during the data charting process:

1. Source characteristics
   a) Published data – Author(s), year of publication, title, journal, and study design.
   b) Grey literature – Author (organisation e.g., Ministry of Health), year of publication, source website (e.g., government/non-government organisation), type of literature (report, thesis, technical report, statistic, other).
2. Study characteristics: Year(s) of data collection, sample size, age group of study population, demographics of study population such as gender and ethnicity. Geographic area (e.g., city, district) and study setting (e.g., facility level).
3. Outcomes as outlined above. We will extract all outcomes at the aggregate level, as well as disaggregated by ethnicity, gender, DHB, and area level deprivation wherever available.

Synthesis of results

We will summarise findings narratively and in tables. Information for each outcome will be disaggregated by cause of impairment, ethnicity, age, geographic region and area level deprivation where these are available.[24]

Where possible, we will use Statistics New Zealand level 2 main categories for ethnicity (European, Māori, Pacific people, Asian and Middle Eastern/Latin American/African),[12] and otherwise report according to information provided by authors.

Where possible, we will use the ICD-11 categories of vision impairment, based on presenting visual acuity in the better eye. i.e. mild vision impairment is visual acuity of 6/12 or worse to 6/18 inclusive; moderate vision impairment is visual acuity worse than 6/18 to 6/60 inclusive; severe vision impairment is visual acuity worse than 6/60 to 3/60 inclusive and blindness is visual acuity worse than 3/60.[25]

ETHICS AND DISSEMINATION

Ethical approval has not been sought as our review will only include published and publicly accessible data. We will publish the review in an open access peer reviewed journal. We anticipate the findings will be useful to organisations and providers in New Zealand responsible to plan and deliver eye care services, as well as stakeholders in other countries with differential access to eye care.

Authors' contributions

JTR drafted the protocol with suggestions from JR, JB, MH, IG and BW who reviewed the protocol and provided feedback on the draft. IG constructed the search. The final version of the protocol was approved by all authors.

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Competing interests

None declared

Patient consent for publication

Not required

Licence statement

JTR is signing on behalf of all co-authors of the work

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Supplementary Annex 1: PRISMA-ScR Checklist

Section	Item	PRISMA-ScR checklist item	Reported on page #
Title			
Title	1	Identify the report as a scoping review.	1
Abstract			
Structured summary	2	Provide a structured summary including, as applicable: background, objectives, eligibility criteria, sources of evidence, charting methods, results and conclusions that relate to the review question(s) and objective(s).	1
Introduction			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review question(s)/objective(s) lend themselves to a scoping review approach.	3
Objectives	4	Provide an explicit statement of the question(s) and objective(s) being addressed with reference to their key elements (e.g., population or participants, concepts, and context), or other relevant key elements used to conceptualize the review question(s) and/or objective(s)).	4
Methods			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., web address), and, if available, provide registration information including registration number.	4
Eligibility criteria	6	Specify the characteristics of the sources of evidence (e.g., years considered, language, publication status) used as criteria for eligibility, and provide a rationale.	4
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with authors to identify additional sources) in the search, as well as the date the most recent search was executed.	5
Search	8	Present the full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	5, Annex 1
Selection of sources of evidence	9	State the process for selecting sources of evidence (i.e., screening, eligibility) included in the scoping review.	5-6
Data charting process	10	Describe the methods of charting data from the included sources of evidence (e.g., piloted forms; forms that have been tested by the team before their use, whether data charting was done independently, in duplicate) and any processes for obtaining and confirming data from investigators.	5-6
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	6
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 summarizing the data that were charted.	6

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. Ann Intern Med. ;169:467–473. doi: 10.7326/M18-0850

Supplementary Annex 2: MEDLINE search terms

1. New Zealand/
2. Aotearoa.tw.
3. (New adj2 Zealand$).tw.
4. (Auckland or Hamilton or Palmerston or Wellington or Nelson or Christchurch or Dunedin).tw.
5. (Maori or Maoris).tw.
6. (Pasifika or Pacifica).tw.
7. (Pacific adj2 (people$ or patient$ or island$)).tw
8. (Samoan or Tongan or Niuean).tw.
9. (Cook adj1 Island$).tw.
10. Te Wai o Rona.tw.
11. or/1-10
12. exp Cataract/
13. cataract$.tw.
14. exp Refractive Errors/
15. (myopia or myopic or myopes or hyperop$ or hypermetrop$ or presbyop$).tw.
16. (refractive adj1 error$).tw.
17. Eyeglasses/
18. (spectacle or spectacles).tw.
19. (eyeglasses or eye glasses).tw.
20. exp Visual Acuity/
21. (visual adj1 acuit$).tw.
22. Retinal Degeneration/ or Macular Degeneration/ or Wet Macular Degeneration/
23. ((macul$ or retina$) adj2 degener$).tw.
24. maculopathy.tw.
25. exp Glaucoma/
26. (glaucoma$ or ocular hypertension).tw.
27. Diabetic Retinopathy/
28. ((diabet$ or proliferat$) adj3 retinopath$).tw.
29. (diabet$ adj3 (eye$ or vision or visual$ or sight$)).tw.
30. (retinopath$ adj3 (eye$ or vision or visual$ or sight$)).tw.
31. (dilated adj2 fundus).tw.
32. (retinal adj2 exam$).tw.
33. Blindness/
34. Vision, Low/
35. ((low$ or impair$ or partial$ or loss$ or limit$) adj3 (vision or visual$ or sight$)).tw.
36. Vision Screening/
37. Vision Tests/
38. Visual Field Tests/
39. ((eye$ or vision or retina$ or ophthalm$ or retinopathy) adj2 exam$).tw.
40. ((eye$ or vision or retinopathy or ophthalm$) adj2 assess$).tw.
41. ((eye$ or vision or retina$ or ophthalm$ or retinopathy) adj2 test$).tw.
42. (eye$ adj2 (disease$ or care or health or service$)).tw.
43. or/12-42
44. 11 and 43
45. Prevalence/
46. prevalence.tw.
47. Health Surveys/
48. "Surveys and Questionnaires"/
49. (health adj2 (survey$ or questionnaire$)).tw.
50. exp Population Surveillance/
51. (population adj2 (base$ or survey$)).tw.
52. Mass Screening/
53. screen$.tw.
54. "Quality of Health Care"/
55. Quality Improvement/
56. Delivery of Health Care/
57. National Health Programs/
58. State Medicine/
59. Regional Health Planning/
60. Health Planning/
61. Health Plan Implementation/
62. Health Planning Guidelines/
63. Health Care Reform/
64. Health Resources/
65. Health Priorities/
66. Health Services Research/
67. "health services needs and demand"/
68. Needs Assessment/
69. State Health Plans/
70. Regional Health Planning/
71. Community Health Planning/
72. Hospital Planning/
73. Regional Medical Programs/
74. Health Maintenance Organizations/
75. Comprehensive Health Care/
76. Health Facility Planning/
77. Health Facility Administration/
78. Hospital Administration/
79. exp Hospitals, public/
80. exp Hospitals, private/
81. health system$.tw.
82. Models, Organizational/
83. Decision Making, Organizational/
84. Resource Allocation/
85. Efficiency, Organizational/
86. Organizational Innovation/
87. Delivery of Health Care, Integrated/
88. Interdisciplinary Communication/
89. Public Health/
90. Health Promotion/
91. Policy Making/
92. Program Development/
93. Program Evaluation/
94. Quality Control/
95. Quality Assurance, Health Care/
96. Benchmarking/
97. Capacity Building/
98. Health Services Accessibility/
99. Health Policy/
100. Surgical Procedures, Operative/
101. exp Surgical Equipment/
102. Health Care Rationing/
103. Medically Underserved Area/
104. exp Communication/

105. exp Culture/
106. Sex Factors/
107. Women's Rights/
108. Prejudice/
109. Vulnerable Populations/
110. Social Responsibility/
111. Social Welfare/
112. Urban Health Services/
113. Rural Health Services/
114. Primary Prevention/
115. Preventive Health Services/
116. Community Health Services/
117. Community Health Nursing/
118. Health Services, Indigenous/
119. Rural Health Services/
120. Mobile Health Units/
121. exp Patient Acceptance of health Care/
122. exp Attitude to Health/
123. exp Health Behavior/
124. Health Education/
125. exp Patient Education as Topic/
126. exp Health Promotion/
127. Socioeconomic Factors/
128. exp Poverty/
129. Social Class/
130. Employment/
131. Healthcare Disparities/
132. Health Status Disparities/
133. Rural Population/
134. Urban Population/
135. exp Ethnic Groups/
136. Minority Groups/
137. ((health$ or social$ or racial$ or ethnic$) adj5 (inequalit$ or inequit$ or disparit$ or equit$ or disadvantage$ or depriv$)).tw.
138. (disadvant$ or marginali$ or underserved or under served or impoverish$ or minorit$ or racial$ or ethnic$).tw.
139. or/45-138
140. exp Eye Diseases/
141. (eye$ or ocular or vision).tw.
142. Ophthalmology/
143. optometry/ or orthoptics/
144. (Ophthalmologist$ or Optometrist$ or Optician$ or Orthopist$ or Refractionists).tw.
145. (Ophthalmic adj3 (surgeon$ or physician$ or nurse$ or technician$ or officer$ or assistant$ or staff$ or worker$)).tw.
146. (eye$ adj3 (surgeon$ or physician$ or nurse$ or technician$ or officer$ or assistant$ or staff$ or worker$)).tw.
147. or/140-146
148. 11 and 139 and 147
149. 44 or 148
150. (rabbit$ or guinea or fish or rat or rats or mouse or mice or bird or birds or chicken).ti.
151. (New adj1 Zealand adj4 rabbit$).tw.
152. (Hamilton adj2 (depression or anxiety or rating)).tw.
153. (Nelson adj2 (staging or stage or grading or grade or classif$ or Mandela or Lord or Admiral or Horatio)).tw.
154. (India or China or Ethiopia).ti.
155. (cell or cells or apoptosis or vitro or vivo).ti.
156.(gene or genes or genetic or polymorph$).ti.
157. (mutation or molecular or chromosome or biopsy or Zika).ti.
158. or/150-157
159. 149 not 158
160. case reports/
161. 159 not 160
162. limit 161 to (editorial or letter)
163. 161 not 162

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Vision impairment and differential access to eye health services in Aotearoa New Zealand: Protocol for a scoping review

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Keywords

Vision impairment, vision screening, vision function, eye health, eye service, eye diseases, healthcare disparity, health equity, optometry, ophthalmology, Māori health, Pacific health, New Zealand

ABSTRACT

Introduction

In Aotearoa New Zealand, Māori and Pacific people experience worse health outcomes compared to other New Zealanders. No population-based eye health survey has been conducted, and eye health services do not generate routine monitoring reports, so the extent of eye health inequality is unknown. This information is required to plan equitable eye health services. Here we outline the protocol for a scoping review to report the nature and extent of the evidence reporting vision impairment, and the use of eye health services by ethnicity in New Zealand.

Methods and analysis

An information specialist will conduct searches on MEDLINE and Embase, with no limit on publication dates or language. We will search the grey literature via websites of relevant government and service provider agencies. Reference lists of included articles will be screened. Observational studies will be included if they report the prevalence of vision impairment, or any of the main causes (cataract, uncorrected refractive error, macular degeneration, glaucoma, or diabetic retinopathy), or report the use of eye health services in New Zealand among people of any age. Two authors will independently review titles, abstracts, and full text articles, and complete data extraction. Overall findings will be summarised using descriptive statistics and thematic analysis, with an emphasis on disaggregation by ethnicity where this information is available.

Ethics and dissemination

Ethical approval has not been sought as our review will only include published and publicly accessible data. We will publish the review in an open access peer reviewed journal. We anticipate the findings will be useful to organisations and providers in New Zealand responsible to plan and deliver eye care services, as well as stakeholders in other countries with differential access to eye care.

Registration details

The protocol has been registered with Open Science Framework: URL https://osf.io/yw7xb

Article summary

Strengths and limitations of this study

- The broad scope of this review will result in the first synthesis to date on the extent of the evidence on vision impairment, its main causes and use of eye health services across ethnicity groups in New Zealand.
- The search will be performed by an information specialist, and screening and data extraction will be performed in duplicate.
- We anticipate limited information on some causes of vision impairment, and inconsistent disaggregation of outcomes by ethnicity.

INTRODUCTION

Rationale

The recent *Lancet Global Health* Commission on Global Eye Health defined eye health as "maximised vision, ocular health, and functional ability, thereby contributing to overall health and wellbeing, social inclusion, and quality of life"[1]. Eye health services are then considered any service which contributes to this broad definition of eye health. The need for accessible eye health services is large and increasing. Globally, an estimated 43 million people were blind, and 295 million people had moderate or severe vision impairment in 2020[2]. In high-income countries, including Aotearoa New Zealand (hereafter referred to as New Zealand), the main causes of blindness and moderate or severe vision impairment (collectively referred to as vision impairment) are cataract, macular degeneration, glaucoma, uncorrected refractive error and diabetic retinopathy[3]. Most people with vision impairment are older adults, however diabetic retinopathy is the leading cause of vision impairment in the working age group[4]. Diabetic retinopathy is projected to be an increasingly common cause of vision impairment in the coming decades due to the rising prevalence of diabetes[5].

Although some countries are striving to reduce health inequalities[6], achieving equitable health outcomes is an intractable challenge[7]. In many countries, people who are Indigenous, living with socioeconomic disadvantage and marginalised communities face barriers to accessing health care[8]. Consequently, systemic and chronic health conditions are more prevalent among these people[9]. They also tend to have higher rates of vision impairment[10, 11]. For example, in Australia the prevalence of cataract is higher among Indigenous people, reflecting lower access to eye health services, compared to non-Indigenous Australians[8, 12].

Māori, the Indigenous people of New Zealand, are one of six main ethnicity groups (defined by Statistics New Zealand as "a cultural group a person identifies with or has a sense of belonging to")[13]. In the 2018 Census, 70% of New Zealanders identified with at least one European ethnicity, 17% identified as Māori, 8% identified with at least one Pacific peoples' ethnicity, 15% identified as Asian, 2% identified as Middle Eastern/Latin American/African and 1% identified as other ethnicity[14].

Inequities in health, and ethnic variations in the prevalence of systemic diseases has been reported in New Zealand[15]. The health gap is persistent between Māori and non-Māori[16]. Chronic conditions such as diabetes, cardiovascular disease and chronic obstructive pulmonary disease are more prevalent among Māori compared to other New Zealanders[17, 18]. Māori also have a 25 fold need for renal replacement therapy[15] and a 30% higher risk of developing a cardiovascular event compared to European New Zealanders[19]. Inequities in health, and ethnic variations in the prevalence of systemic diseases has been reported in New Zealand[15]. The health gap is persistent between Māori and non-Māori[16]. Chronic conditions such as diabetes, cardiovascular disease and chronic obstructive pulmonary disease are more prevalent among Māori compared to other New Zealanders[17, 18]. Māori also have a 25 fold need for renal replacement therapy[15] and a 30% higher risk of developing a cardiovascular event compared to European New Zealanders[19].

Inequities in eye health are well-documented in several high-income countries[12, 20, 21]. In New Zealand the extent of inequity in eye health is largely unknown. New Zealand has never had a population-based eye health survey. A systematic review has been conducted on diabetic retinopathy prevalence and services[22], but synthesis of information on other causes of vision impairment has not been undertaken. This information would assist decision-makers to plan equitable eye health services.

The aim of this scoping review is to summarise the nature and extent of evidence in New Zealand on:

1) The distribution of vision impairment and its major causes by ethnicity; and
2) Differential access to eye health services by ethnicity.

As there is no New Zealand-specific information available on the main causes of vision impairment, we will assess the evidence on main causes in high-income countries[3]. We chose to undertake a scoping review rather than a systematic review, as we anticipate that the available evidence will be heterogenous[23].

METHODS AND ANALYSIS

We will follow the methodological steps for scoping reviews outlined by Arksey and O'Malley[23]. Our team includes researchers (JB, MH, JRa) with experience in conducting scoping reviews including on service delivery models to address inequities in eye health[24, 25].

Objectives/scoping review questions

To achieve our aim we will answer the following questions:

1) What is the nature and extent of the available evidence on vision impairment in New Zealand?
2) What is the available evidence on the prevalence of the major causes of vision impairment in New Zealand?
3) How and in what ways is vision impairment and its major causes distributed across ethnicity groups?
4) What is the available evidence on differential access to eye health services for the major causes of vision impairment by ethnicity?

Protocol and registration

The protocol for this scoping review is reported according to the relevant items of the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) checklist (supplementary annex 1)[26]. The protocol has been registered with Open Science Framework: URL https://osf.io/yw7xb.

Patient and public involvement

There are no patient or public involvement as our review will only include published and publicly accessible data.

Eligibility criteria

We will include studies that meet the following criteria:

Context

Studies will be included if they report outcomes among residents of New Zealand (whether disaggregated by ethnicity or not), or attendees at New Zealand health facilities (regardless of size, public/private sector, or level of care). Multi-country studies will be included if the results are reported separately for New Zealand.

Types of studies

Observational study types such as cross sectional, case control and consecutive case series will be included. Non-consecutive cases series will be excluded. Research letters and grey literature, such as District Health Board (DHB) reports will be included, if they report data for at least one of our outcomes of interest. Editorials and conference abstracts will be excluded. We will have no time limit or language restrictions. Only studies where the full article is available will be included. We will use the University of Auckland's comprehensive inter-library loan service to retrieve articles not readily available.

Participants

We will include studies of any population group resident in New Zealand. There will be no age or gender restriction.

Concept/Outcomes

We will include studies that report at least one of:

- the prevalence of vision impairment;
- the prevalence of cataract, uncorrected refractive error, macular degeneration, glaucoma or diabetic retinopathy;
- the prevalence of vision impairment due to cataract, uncorrected refractive error, macular degeneration, glaucoma or diabetic retinopathy;
- attendance at eye health service such as ophthalmology services, optometric services, and eye health screening programmes (e.g., diabetic retinal screening, children vision screening);
- rates of treatment for cataract, uncorrected refractive error, macular degeneration, glaucoma, or diabetic retinopathy.

We will include studies which report these outcomes by person. Studies which only report the outcomes by eye or by eye health service visit will be excluded.

Search

Published literature search

We will search MEDLINE and Embase using search strategies developed by a Cochrane Eyes and Vision Information Specialist (IG). Our search strategy used on MEDLINE is included in supplementary annex 2. We will apply a backward and forward snowball citation approach[27]. We will examine reference lists of all included articles (backward) and also examine studies which have cited our included articles (forward) to identify potentially relevant studies.

Grey literature search

We will include grey literature that report data for at least one of our outcomes. General search terms will be used to identify eligible information within each website. Relevant links within documents to other sources of information will be pursued. A single reviewer will perform the search and identify eligible data, with verification from a second reviewer.

Using Google search engine, separate searches will be performed across:

- New Zealand government websites such as Ministry of Health and district health boards;
- Professional associations such as New Zealand Association of Optometry (NZAO) and the Royal Australian and New Zealand College of Ophthalmologists (RANZCO);

- Non-profit organisations and charitable trusts such as Blind Low Vision New Zealand and Macular Degeneration New Zealand.

We will limit our search to the first 20 items of Google search engines.
Google search terms will include:

- "vision", "eye", "eye health", "eye service", "vision tests" and "vision screening"
- "cataract", "uncorrected refractive error", "macular degeneration", "glaucoma" or "diabetic retinopathy".

In addition, field experts and key stakeholders will be contacted to share our list of included studies and request to identify further potentially relevant studies for consideration in the review.

Study selection

Covidence systematic review software will be used for screening (Veritas Health Innovation, Melbourne, Australia. Available at: www.covidence.org). Two reviewers will independently screen the title and abstract of identified studies to exclude publications that clearly do not meet the inclusion criteria. The full text article will be retrieved for review (via the University of Auckland library) if the citation seems potentially relevant. Any discrepancies between the reviewers will be resolved by discussion and a third reviewer will be consulted if necessary. A PRISMA flow diagram will be completed to summarise the study selection process.

Data charting process

A custom form will be developed in Excel for data charting. The form will be piloted on three studies and required amendments agreed by consensus. As we anticipate a broad scope of studies, the data charting process will be iterative, and the data charting form will be amended as required. Each included study will be charted independently by two reviewers. Any discrepancies between the reviewers will be resolved by discussion, and a third reviewer will be consulted if necessary. We plan to contact study authors in the case of unclear information and will make up to three attempts by email.

Data items

The following data items will be collected during the data charting process:

1. Source characteristics
   a) Published data – Author(s), year of publication, title, journal, and study design.
   b) Grey literature – Author (organisation e.g., Ministry of Health), year of publication, source website (e.g., government/non-government organisation), type of literature (report, thesis, technical report, statistic, other).
2. Study characteristics: Year(s) of data collection, sample size, age group of study population, demographics of study population such as gender and ethnicity. Geographic area (e.g., city, district) and study setting (e.g., facility level).
3. Outcomes as outlined above. We will extract all outcomes at the aggregate level, as well as disaggregated by ethnicity, gender, DHB, and area level deprivation wherever available.

Synthesis of results

We will summarise findings narratively and in tables. Information for each outcome will be disaggregated by cause of impairment, ethnicity, age, geographic region and area level deprivation where these are available[28].

Where possible, we will use Statistics New Zealand level 2 main categories for ethnicity (European, Māori, Pacific people, Asian and Middle Eastern/Latin American/African),[13] and otherwise report according to information provided by authors.

Where possible, we will use the ICD-11 categories of vision impairment, based on presenting visual acuity in the better eye. i.e. mild vision impairment is visual acuity of 6/12 or worse to 6/18 inclusive; moderate vision impairment is visual acuity worse than 6/18 to 6/60 inclusive; severe vision impairment is visual acuity worse than 6/60 to 3/60 inclusive and blindness is visual acuity worse than 3/60[29].

We will share our synthesis of the results with the field experts and key stakeholders engaged during the search process, to get feedback on our summary of results[23].

ETHICS AND DISSEMINATION

Ethical approval has not been sought as our review will only include published and publicly accessible data. We will publish the review in an open access peer reviewed journal. We anticipate the findings will be useful to organisations and providers in New Zealand responsible to plan and deliver eye care services, as well as stakeholders in other countries with differential access to eye care.

Authors' contributions

JTR drafted the protocol with suggestions from JR, JB, MH, IG and BW who reviewed the protocol and provided feedback on the draft. IG constructed the search. The final version of the protocol was approved by all authors.

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Competing interests

None declared

Patient consent for publication

Not required

Licence statement

JTR is signing on behalf of all co-authors of the work

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Supplementary Annex 1: PRISMA-ScR Checklist

Section	Item	PRISMA-ScR checklist item	Reported on page #
Title			
Title	1	Identify the report as a scoping review.	1
Abstract			
Structured summary	2	Provide a structured summary including, as applicable: background, objectives, eligibility criteria, sources of evidence, charting methods, results and conclusions that relate to the review question(s) and objective(s).	1
Introduction			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review question(s)/objective(s) lend themselves to a scoping review approach.	3
Objectives	4	Provide an explicit statement of the question(s) and objective(s) being addressed with reference to their key elements (e.g., population or participants, concepts, and context), or other relevant key elements used to conceptualize the review question(s) and/or objective(s)).	4
Methods			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., web address), and, if available, provide registration information including registration number.	4
Eligibility criteria	6	Specify the characteristics of the sources of evidence (e.g., years considered, language, publication status) used as criteria for eligibility, and provide a rationale.	4
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with authors to identify additional sources) in the search, as well as the date the most recent search was executed.	5
Search	8	Present the full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	5, Annex 1
Selection of sources of evidence	9	State the process for selecting sources of evidence (i.e., screening, eligibility) included in the scoping review.	5-6
Data charting process	10	Describe the methods of charting data from the included sources of evidence (e.g., piloted forms; forms that have been tested by the team before their use, whether data charting was done independently, in duplicate) and any processes for obtaining and confirming data from investigators.	5-6
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	6
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 summarizing the data that were charted.	6

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. Ann Intern Med. ;169:467–473. doi: 10.7326/M18-0850

Supplementary Annex 2: MEDLINE search terms

1. New Zealand/
2. Aotearoa.tw.
3. (New adj2 Zealand$).tw.
4. (Auckland or Hamilton or Palmerston or Wellington or Nelson or Christchurch or Dunedin).tw.
5. (Maori or Maoris).tw.
6. (Pasifika or Pacifica).tw.
7. (Pacific adj2 (people$ or patient$ or island$)).tw
8. (Samoan or Tongan or Niuean).tw.
9. (Cook adj1 Island$).tw.
10. Te Wai o Rona.tw.
11. or/1-10
12. exp Cataract/
13. cataract$.tw.
14. exp Refractive Errors/
15. (myopia or myopic or myopes or hyperop$ or hypermetrop$ or presbyop$).tw.
16. (refractive adj1 error$).tw.
17. Eyeglasses/
18. (spectacle or spectacles).tw.
19. (eyeglasses or eye glasses).tw.
20. exp Visual Acuity/
21. (visual adj1 acuit$).tw.
22. Retinal Degeneration/ or Macular Degeneration/ or Wet Macular Degeneration/
23. ((macul$ or retina$) adj2 degener$).tw.
24. maculopathy.tw.
25. exp Glaucoma/
26. (glaucoma$ or ocular hypertension).tw.
27. Diabetic Retinopathy/
28. ((diabet$ or proliferat$) adj3 retinopath$).tw.
29. (diabet$ adj3 (eye$ or vision or visual$ or sight$)).tw.
30. (retinopath$ adj3 (eye$ or vision or visual$ or sight$)).tw.
31. (dilated adj2 fundus).tw.
32. (retinal adj2 exam$).tw.
33. Blindness/
34. Vision, Low/
35. ((low$ or impair$ or partial$ or loss$ or limit$) adj3 (vision or visual$ or sight$)).tw.
36. Vision Screening/
37. Vision Tests/
38. Visual Field Tests/
39. ((eye$ or vision or retina$ or ophthalm$ or retinopathy) adj2 exam$).tw.
40. ((eye$ or vision or retinopathy or ophthalm$) adj2 assess$).tw.
41. ((eye$ or vision or retina$ or ophthalm$ or retinopathy) adj2 test$).tw.
42. (eye$ adj2 (disease$ or care or health or service$)).tw.
43. or/12-42
44. 11 and 43
45. Prevalence/
46. prevalence.tw.
47. Health Surveys/
48. "Surveys and Questionnaires"/
49. (health adj2 (survey$ or questionnaire$)).tw.
50. exp Population Surveillance/
51. (population adj2 (base$ or survey$)).tw.
52. Mass Screening/
53. screen$.tw.
54. "Quality of Health Care"/
55. Quality Improvement/
56. Delivery of Health Care/
57. National Health Programs/
58. State Medicine/
59. Regional Health Planning/
60. Health Planning/
61. Health Plan Implementation/
62. Health Planning Guidelines/
63. Health Care Reform/
64. Health Resources/
65. Health Priorities/
66. Health Services Research/
67. "health services needs and demand"/
68. Needs Assessment/
69. State Health Plans/
70. Regional Health Planning/
71. Community Health Planning/
72. Hospital Planning/
73. Regional Medical Programs/
74. Health Maintenance Organizations/
75. Comprehensive Health Care/
76. Health Facility Planning/
77. Health Facility Administration/
78. Hospital Administration/
79. exp Hospitals, public/
80. exp Hospitals, private/
81. health system$.tw.
82. Models, Organizational/
83. Decision Making, Organizational/
84. Resource Allocation/
85. Efficiency, Organizational/
86. Organizational Innovation/
87. Delivery of Health Care, Integrated/
88. Interdisciplinary Communication/
89. Public Health/
90. Health Promotion/
91. Policy Making/
92. Program Development/
93. Program Evaluation/
94. Quality Control/
95. Quality Assurance, Health Care/
96. Benchmarking/
97. Capacity Building/
98. Health Services Accessibility/
99. Health Policy/
100. Surgical Procedures, Operative/
101. exp Surgical Equipment/
102. Health Care Rationing/
103. Medically Underserved Area/
104. exp Communication/

105. exp Culture/
106. Sex Factors/
107. Women's Rights/
108. Prejudice/
109. Vulnerable Populations/
110. Social Responsibility/
111. Social Welfare/
112. Urban Health Services/
113. Rural Health Services/
114. Primary Prevention/
115. Preventive Health Services/
116. Community Health Services/
117. Community Health Nursing/
118. Health Services, Indigenous/
119. Rural Health Services/
120. Mobile Health Units/
121. exp Patient Acceptance of health Care/
122. exp Attitude to Health/
123. exp Health Behavior/
124. Health Education/
125. exp Patient Education as Topic/
126. exp Health Promotion/
127. Socioeconomic Factors/
128. exp Poverty/
129. Social Class/
130. Employment/
131. Healthcare Disparities/
132. Health Status Disparities/
133. Rural Population/
134. Urban Population/
135. exp Ethnic Groups/
136. Minority Groups/
137. ((health$ or social$ or racial$ or ethnic$) adj5 (inequalit$ or inequit$ or disparit$ or equit$ or disadvantage$ or depriv$)).tw.
138. (disadvant$ or marginali$ or underserved or under served or impoverish$ or minorit$ or racial$ or ethnic$).tw.
139. or/45-138
140. exp Eye Diseases/
141. (eye$ or ocular or vision).tw.
142. Ophthalmology/
143. optometry/ or orthoptics/
144. (Ophthalmologist$ or Optometrist$ or Optician$ or Orthopist$ or Refractionists).tw.
145. (Ophthalmic adj3 (surgeon$ or physician$ or nurse$ or technician$ or officer$ or assistant$ or staff$ or worker$)).tw.
146. (eye$ adj3 (surgeon$ or physician$ or nurse$ or technician$ or officer$ or assistant$ or staff$ or worker$)).tw.
147. or/140-146
148. 11 and 139 and 147
149. 44 or 148
150. (rabbit$ or guinea or fish or rat or rats or mouse or mice or bird or birds or chicken).ti.
151. (New adj1 Zealand adj4 rabbit$).tw.
152. (Hamilton adj2 (depression or anxiety or rating)).tw.
153. (Nelson adj2 (staging or stage or grading or grade or classif$ or Mandela or Lord or Admiral or Horatio)).tw.
154. (India or China or Ethiopia).ti.
155. (cell or cells or apoptosis or vitro or vivo).ti.
156.(gene or genes or genetic or polymorph$).ti.
157. (mutation or molecular or chromosome or biopsy or Zika).ti.
158. or/150-157
159. 149 not 158
160. case reports/
161. 159 not 160
162. limit 161 to (editorial or letter)
163. 161 not 162