Assessing the gaps in cardiovascular disease risk assessment and management in primary care for Māori and Pacific peoples in Aotearoa New Zealand— a systematic review

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Summary

Background Māori and Pacific peoples carry the highest burden of cardiovascular disease in New Zealand (NZ). This systematic review aimed to determine access to evidence-based cardiovascular disease risk assessment (CVDRA) and management in primary care for Māori and Pacific peoples compared with other ethnicities in NZ, as well as factors contributing to reduced access.

Methods In this systematic review with a narrative synthesis, keywords related to Māori and Pacific peoples, cardiovascular disease, and primary care were used to search MEDLINE (OVID), EMBASE, Scopus, CINAHL, NZresearch.org, National Library Catalogue (Te Puna), Index New Zealand (INNZ), and Australia/New Zealand Reference Centre, grey literature and hand search sources from 1 January 2000 to 31 December 2024. Two reviewers screened texts and three reviewers extracted data and assessed quality. High quality was defined using Western (Mixed Methods Appraisal Tool, MMAT, ≥80% compliance) and Indigenous (CONSolIDated critERtia for strengthening the reporting of health research involving Indigenous Peoples, CONSIDER) research tools. The protocol for this systematic review was registered at: https://doi.org/10.17605/OSF.IO/VUDE9.

Findings A total of 2765 texts were identified of which 69 were included. This review identified inadequate levels of CVDRA in Māori and Pacific peoples when measured against the 90% national target. While the provision of primary prevention medications was higher (antihypertensives) or similar (lipid-lowering) compared to that for other ethnic groups, adherence was lower for Māori and Pacific peoples compared to other groups. Māori and Pacific peoples were less likely than others to receive antiplatelets and lipid-lowering therapy for secondary prevention. Evidence for antihypertensives in secondary prevention and combination therapy (in primary or secondary prevention) was mixed. Māori and Pacific peoples experienced reduced access to revascularisation compared with other ethnic groups, an inequity that persisted over time. Factors contributing to CVDRA and management were provision of adequate health literacy, relationships with providers and whānau, access to care, and cultural safety. While 64% of studies were ≥80% compliant with the MMAT, suggesting high quality from a Western research perspective, 71% of studies had an adapted CONSIDER score ≤2, suggesting low quality from an Indigenous perspective. The CONSIDER domains with the highest levels of reporting were Prioritisation, and Analysis and interpretation, while Capacity and Dissemination were the least reported domains. Qualitative studies had generally higher levels of CONSIDER reporting than mixed methods and quantitative studies. Kaupapa Māori Research was of the highest quality, followed by studies focused on Māori and/or Pacific peoples, while studies not focused on Māori and/or Pacific peoples had the lowest levels of CONSIDER reporting.

Interpretation Extensive and inequitable gaps in CVDRA and management for Māori and Pacific peoples were identified. Opportunities for reducing these gaps include providing adequate CVD literacy, involvement of whanāu, patient-provider relationships, access to care, and enhancing cultural safety. Our findings will contribute to the development of a cardiovascular care equity roadmap in NZ. There are opportunities to improve reporting against the adapted CONSIDER criteria, which involves critical inquiry and a strength-based approach inclusive of Māori

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and Pacific values, particularly in quantitative research and research including but not focusing on Māori and Pacific peoples.

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Keywords: Māori; Pacific; Indigenous; Equity; Cardiovascular risk; Cardiovascular disease; CVDRA; Cardiovascular risk assessment; Cardiovascular risk management; Primary care; Primary prevention; Secondary prevention; Antiplatelet therapy; Antihypertensive therapy; Lipid-lowering therapy; Percutaneous coronary intervention; Inequity; CONSIDER; Consolidated criteria for strengthening reporting of health research involving Indigenous people

Research in context

Evidence before this study

There is extensive evidence that Māori and Pacific peoples have poorer cardiovascular health, morbidity, and mortality compared to non-Māori, non-Pacific peoples in Aotearoa New Zealand (NZ). Evidence for specific gaps in care has been published, but a comprehensive literature review had not been performed. A recent systematic review identified gaps in primary CVD prevention affecting Indigenous peoples internationally.

Added value of this study

This study provides a comprehensive review of the heterogenous and extensive literature published from 2000 to 2024 identifying gaps in cardiovascular care for Māori and Pacific peoples in primary care in NZ. Differences in care for Māori and Pacific peoples compared to non-Māori, non-Pacific peoples are discussed in a narrative synthesis focusing on CVDRA, primary prevention following CVDRA, access to cardiac investigations and interventions, and secondary prevention following a CVD event. Factors contributing to ethnic gaps in cardiovascular care in NZ were also identified, including differences in the cultural appropriateness and safety of cardiovascular care. Strong Māori and Pacific governance and prioritisation of Māori and Pacific voices throughout the review process ensure that this research is sensitive to the needs of Māori and Pacific peoples and decolonising in nature.

Implications of all the available evidence

The key findings of this systematic review suggest gaps in CVDRA and management for Māori and Pacific peoples in NZ. Māori and Pacific peoples in NZ are receiving suboptimal rates of CVDRA, and use of preventive medicine needs to be improved, particularly primary prevention with lipid-lowering agents and secondary prevention with antiplatelets and lipid-lowering agents. Areas to target include building health literacy, involving whānau, enhancing the patient-provider relationship, improving access to care, and improving the cultural appropriateness of care specific to the needs of Māori and Pacific peoples. Increased reporting of cardiovascular research in NZ against the CONSIDER statement would improve responsiveness to Māori and Pacific peoples.

Introduction

Māori are the Indigenous people of Aotearoa New Zealand (NZ), comprising 17.8% of its total population.[1] At the signing of Te Tiriti o Waitangi in 1840 the Crown made a commitment to achieving equitable health outcomes for Māori and non-Māori.[2] Nearly 200 years on from this event, Māori experience significantly poorer health outcomes than non-Māori, with over half of Māori deaths attributable to potentially avoidable causes.[3,4] Pacific peoples comprise 8.9% of the population in NZ and carry a similar burden of inequitable health outcomes to Māori.[1,5] Pacific peoples in NZ are mainly from Samoa, Tonga, Cook Islands, Niue, Fiji, Tokelau, and Tuvalu and most have lived in NZ for more than ten years, with the majority now born in NZ.[6,7] Māori and Pacific peoples experience higher mortality rates than non-Māori, non-Pacific peoples, with a 6–7-year gap in life expectancy.[3] Avoidable causes of death account for a large proportion of this gap, to which cardiovascular disease (CVD) is a key contributor.[7]

Māori and Pacific peoples have the highest burden of CVD in NZ and experience higher cardiovascular risk and risk factor levels than non-Māori, non-Pacific peoples (including diabetes, hypertension, hypercholesterolaemia, smoking, and obesity).[8–13] Ethnic inequities are a result of complex factors including inequitable access to the socioeconomic determinants of health such as income, housing, and education for Māori and Pacific peoples in NZ.[4,5] New Zealand has set an international precedent in its development of a web-based clinical decision support tool for CVD based on population data. Since 2002, PREDICT-CVD has informed evidence-based guidelines on the assessment and management of CVD risk in NZ primary care. The PREDICT guidelines stipulate screening of Māori and Pacific peoples 15 years earlier than other ethnic groups

as they are more likely to experience CVD, including coronary heart disease and stroke, at a younger age.[14–17] Following cardiovascular disease risk assessment (CVDRA), management involves lifestyle advice for all patients and antihypertensive and lipid-lowering therapy for some intermediate-risk patients and all high-risk patients.[16] Those with established CVD require secondary prevention with triple therapy (aspirin, antihypertensive, and lipid-lowering medications). In addition, Māori and Pacific peoples have higher rates of atrial fibrillation (AF) at a younger age than non-Māori, non-Pacific peoples, and higher stroke risk at onset of AF.[18–21]

Māori and Pacific peoples experience higher post-myocardial infarction (MI) mortality rates than European/other ethnicities. At least half of this inequity in Māori and three-quarters in Pacific peoples is associated with differences in preventable or modifiable clinical factors present at or prior to presentation with a first cardiac event, suggesting a deficit in primary prevention.[22] Inequities in access to preventive CVD care for Māori and Pacific peoples have been recognised, including differences in access to secondary prevention with statin therapy.[23] However, CVDRA and management in primary care has not yet been evaluated. A previous systematic review evaluated primary prevention of cardiovascular disease in Indigenous peoples and included 19 texts, of which two involved Māori. This review indicated gaps in CVD screening and prescription of primary preventive medications for minority Indigenous populations, although secondary prevention was not studied. The review found that CVD programmes targeted at the social determinants of health and holistic wellbeing could be effective, and barriers to accessing CVD preventive care included miscommunication, discrimination, lack of culturally sensitive care, and mistrust in healthcare systems.[24] The findings of this review may not be representative of the experiences of Māori and Pacific peoples in NZ, as each Indigenous population is unique and may be differentially affected by CVD risk factors, the determinants of health, and healthcare systems.[24] To our knowledge there are no reviews specific to CVDRA and management for Māori and Pacific peoples in Aotearoa, focusing on both primary and secondary CVD prevention. This systematic review aims to quantify and qualify already-reported gaps in primary and secondary CVDRA and management in primary care for Māori and Pacific peoples, compared to non-Māori, non-Pacific peoples in NZ.[25] This review is part of Manawataki Fatu Fatu for ACCESS (Māori and Pacific hearts in unison for Achieving Cardiovascular Care in Equity StudieS), a Māori and Pacific-led research programme which aims to identify evidence-practice gaps in cardiovascular care for Māori and Pacific peoples in NZ.[26] Members of Māori and Pacific communities have identified this as an important research topic that will contribute to the development of a Quality Improvement Equity Roadmap to improve CVD outcomes for Māori and Pacific peoples.[25,26]

Methods

A protocol outlining the methods for this systematic review has been published and registered elsewhere.[25] This review employed a systematic search strategy and a narrative approach to data synthesis. Our review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and MetaAnalyses (PRISMA) guidelines, and a PRISMA checklist has been provided in Appendix 8. The CONSIDER statement was used to inform the review protocol, with Māori and Pacific governance, leadership, prioritisation, relationships with stakeholders, capacity development, inclusion of Māori and Pacific perspectives in the analysis and interpretation of results, and a plan to disseminate results in avenues that promote access to healthcare for Māori and Pacific peoples. The study protocol was registered on Open Science Framework at: https://doi.org/10.17605/OSF.IO/VUDE9.

Search strategy

Medical subject headings (MeSH) and text words related to Māori and Pacific peoples, CVD and primary care were used to conduct database searches across MEDLINE (OVID), EMBASE, Scopus, CINAHL, NZresearch.org, National Library Catalogue (Te Puna), Index New Zealand (INNZ), and Australia/New Zealand Reference Centre databases for articles published between 1 January 2000 and 31 December 2024, as well as grey literature and predefined hand search sources (Appendix 1).[25] An initial search date of 2000 was selected to capture publications pertaining to the establishment of PREDICT-CVD in 2002. The initial search was completed by KMB in 2022 and the list of yielded results was combined with the results of an updated search completed by AW in 2023. A repeat search was completed by AW in 2025 to capture publications up to and including 31 December 2024.

Eligibility criteria

AW screened all titles and abstracts against the predefined inclusion and exclusion criteria (Table 1). Texts were included if they met these criteria, reported on primary or secondary CVDRA or management in NZ primary care and included participants of Māori and or/Pacific ethnicity. Studies where measuring gaps in CVDRA or management was not the focus, and general population studies where Māori and/or Pacific peoples were not the focus group, were eligible for inclusion. AW reviewed all full texts and J-LR performed an independent review of "Might be Eligible" texts and a sample of "Eligible" texts to confirm their inclusion. J-LR independently screened 51 of the 69 included texts (74%). For texts where there was uncertainty, a third

Inclusion criteria	Exclusion criteria
• All study designs, including qualitative, quantitative, and mixed methods. • Literature dated from 1 January 2000 to 31 December 2024. • Texts in all languages. • Studies specifying that they included participants of Māori and/or Pacific ethnicity. Pacific ethnicity will include those that are indigenous to the South Pacific subregions of Niue, Cook Islands, Fiji, Hawaii, Tokelau, Kiribati, Tuvalu, Tahiti, Wallis and Futuna, Nauru, Papua New Guinea, Solomon Islands, Vanuatu, French Polynesia, Tonga, New Caledonia, Guam, Federated States of Micronesia, Palau, Pitcairn Island, Samoa, Marshall Islands, Easter Island, Rotuma. • Participants' primary and secondary CVD risk assessment and/or management is indicated as per the current guidelines, or earlier versions, as relevant to the study.	• Texts that do not pass the two screening questions in the Mixed Methods Appraisal Tool (MMAT) (i.e., Are there clear research questions? Do the collected data allow to address the research questions?) • Texts that do not have a research question or are not the primary source, for example, opinion pieces or reports that do not report new data. • Studies focused solely on non-cardiovascular heart disease (e.g., rheumatic heart disease, for which the cause is different from atherosclerotic CVD). • Studies focused on specific peripheral vascular disease management techniques, for example, podiatry. • Studies for which the full text is not available, for example, conference abstracts. • Studies that took place outside the primary care setting in the realm of New Zealand including the three Pacific nations of Cook Islands, Niue, and Tokelau (noting that the New Zealand guidelines for CVD risk assessment and management for primary care are only applied within New Zealand, not the realm countries).

Table 1: **Inclusion and exclusion criteria.**[25]

senior reviewer (MH) was involved. During the screening process J-LR and AW identified outcomes reported in each text according to Table 2, and these were later confirmed during the data extraction process carried out on eligible texts. AW was responsible for mapping outcomes during data analysis.

Data extraction

Data extraction was independently completed by three reviewers (AW, SH, and RE-L) using a spreadsheet including author, title, year, aims, study design, methods, inclusion/exclusion criteria, focus (Māori, Pacific, or both), recruitment procedures, sample size, ethnic groups, results, outcome/s reported (according to Table 2) and overall contribution to knowledge about the gaps in CVDRA and management for Māori and Pacific peoples in primary care in NZ, which was a qualitative interpretation of the study findings to aid the narrative synthesis.[25] RE-L completed data extraction and quality assessment using the MMAT and adapted CONSIDER criteria on 18 included texts, while SH completed data extraction and quality assessment on 7 included texts, and AW completed data extraction and quality assessment on all 69 included texts. RE-L and SH particularly focused on texts that included or focused on Pacific peoples to provide Pacific perspectives in the analysis and interpretation of results. Data extraction was not able to be verified by two independent reviewers for all texts included in this review. There were eight discrepancies between reviewers, mainly pertaining to the application of the adapted CONSIDER criteria to quality assessment, and the definitions of Governance, Prioritisation, and Relationships. These discrepancies were resolved by discussion with J-LR and MH, giving rise to clarified criteria which were henceforth applied to reassessment of quality in all included studies.

Risk of bias assessment

The 2018 Mixed Methods Appraisal Tool (MMAT) and the adapted cONSolIDated critERtia for strengthening the reporting of health research involving Indigenous Peoples (CONSIDER) were used to assess for risk of bias in this review (Appendix 2). The CONSIDER framework was adapted for quality assessment by

Outcome A: Administration of guideline recommended CVDRA, and discussion of factors that contribute to these.	Outcome B: Gaps in primary prevention, and discussion of factors that contribute to these.	Outcome C: Gaps in secondary prevention, and discussion of factors that contribute to these.	Outcome D: Differences in referrals for, and provision of, cardiovascular investigations and interventions.	Outcome E: Gaps in cultural appropriateness and/or safety of cardiovascular care.
	• Differences in behavioural support, including: ○ Green prescription referrals (which aim to facilitate access to gyms and other exercise facilities). ○ Smoking cessation support. • Differences in prescribing and use (prescription, dispensing, utilisation, or adherence) of antiplatelet, antihypertensive and/or lipid-lowering therapy. • Differences in interventions that address health literacy (including access to culturally appropriate resources).	• Differences in prescription and use of antiplatelet medication. • Differences in prescription and use of lipid-lowering medication. • Differences in prescription and use of blood pressure-lowering medication.	Angiography, percutaneous coronary intervention (PCI), or coronary artery bypass graft (CABG).	• Gaps in cultural appropriateness and/or safety of CVDRA in primary care. • Gaps in cultural appropriateness and/or safety of primary CVD prevention in primary care. • Gaps in cultural appropriateness and/or safety of secondary CVD prevention in primary care.

Table 2: **The outcomes for CVD risk assessment in primary care.**[25]

members of the Manawataki Fatu Fatu for ACCESS research team and published in the systematic review protocol (Table 1). Eight key domains from the CONSIDER checklist were adapted from a seventeen-point checklist into the eight criteria of Governance, Prioritisation, Relationships, Methodologies and Methods, Participation, Capacity, Analysis and Interpretation, and Dissemination. CONSIDER is not a tool for critical appraisal but a checklist designed to strengthen the quality of research involving Indigenous Peoples.[27] The tool has previously been adapted for quality assessment in scoping and systematic reviews.[28–30] With Pacific peoples being Indigenous to the Pacific region and experiencing similar health inequities to Māori, our research group determined that the adapted CONSIDER statement would be an appropriate tool for assessing responsiveness of texts to the values and needs of Māori and Pacific communities within NZ. The level of inclusion of Māori and/or Pacific peoples was determined based on the Guidelines for Researchers on Health Research Involving Māori as follows[31]:

- Studies that included Māori and/or Pacific peoples (Unfocused studies): Māori or Pacific participants were involved in the study but were not the focus group.
- Studies that focused on Māori and/or Pacific peoples (Focused studies): Māori and/or Pacific peoples were the focus of the study. The study may include other ethnic groups but was focused on measuring inequities for Māori and/or Pacific peoples.
- Kaupapa Māori Research: the study explicitly states that Kaupapa Māori Research methodologies were used.

Study quality was categorised as ≥80% compliant, 60% compliant, and ≤40% compliant with the MMAT criteria.[32] Texts were further categorised based on the number of adapted CONSIDER criteria that were met.[27] AW performed quality assessment on all included texts and SH and RE-L independently assessed a selection of studies focused on Pacific peoples. It is acknowledged that the respective authors of MMAT and CONSIDER have not recommended specific cut-off values for these quality assessment tools, hence the authors of this review have provided a description of each text's limitations according to the MMAT and strengths according to the adapted CONSIDER framework in Appendix 3.

Data synthesis

This systematic review involved a narrative synthesis of quantitative, qualitative, and mixed methods studies. For the qualitative arm of the study, thematic analysis was conducted in a method similar to that described by Thomas and Harden, with descriptive themes manually abstracted from each study to create new analytical themes during analysis.[33] This process was completed by a single reviewer (AW) using Microsoft Word.

Changes to protocol

Three researchers joined the Manawataki Fatu Fatu research team in 2023 and 2024 (AW, J-LR and RE-L). The review protocol stated that data extraction would be shared evenly between three reviewers. Data extraction was first completed by AW, while SH and RE-L reviewed selected studies that involved Pacific peoples, as described above. The search period was extended to capture recent publications.

Ethics approval

Ethical approval was not required for this systematic review.

Role of the funding source

The funder of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report.

Results

A total of 2404 articles were identified from database searches in addition to 361 articles identified from grey literature and hand searches. Sixty-nine texts were included in the review, of which 51 were quantitative, 12 were qualitative, and six were mixed methods studies (Fig. 1). Twenty-two studies included Māori (32%), 10 included Pacific peoples (14%), and 37 included both Māori and Pacific peoples (54%). Thirty-four studies (49%) included Māori and/or Pacific peoples without focusing on them, 28 studies (41%) focused on Māori and/or Pacific peoples, and 7 studies (10%) followed a Kaupapa Māori approach. Most of the quantitative studies were cohort studies (n = 28) with 17 cross-sectional studies, four intervention programmes, and two randomised controlled trials (RCTs). Full details of the characteristics of included studies and extracted results are available in Appendix 3. The most reported outcome was Administration of CVDRA (14 studies), followed by differences in lipid-lowering therapy for secondary prevention (13 studies), and all other outcomes had between five and nine studies each, except for access to cardiac rehabilitation which was only reported in two studies. Research focusing on differences in cardiovascular investigations and interventions had not been updated, with the most recent publication reporting data from 2012.[34] Quality issues with studies with MMAT ≤ 40% were broad and variable, and the most common issues were that the exposure or intervention did not occur as intended, and risk of confounding. Median CONSIDER quality was low (0–2/8) across all outcomes except for differences in cardiac rehabilitation programmes. Details on the availability of quantitative data are published in Appendix 5.

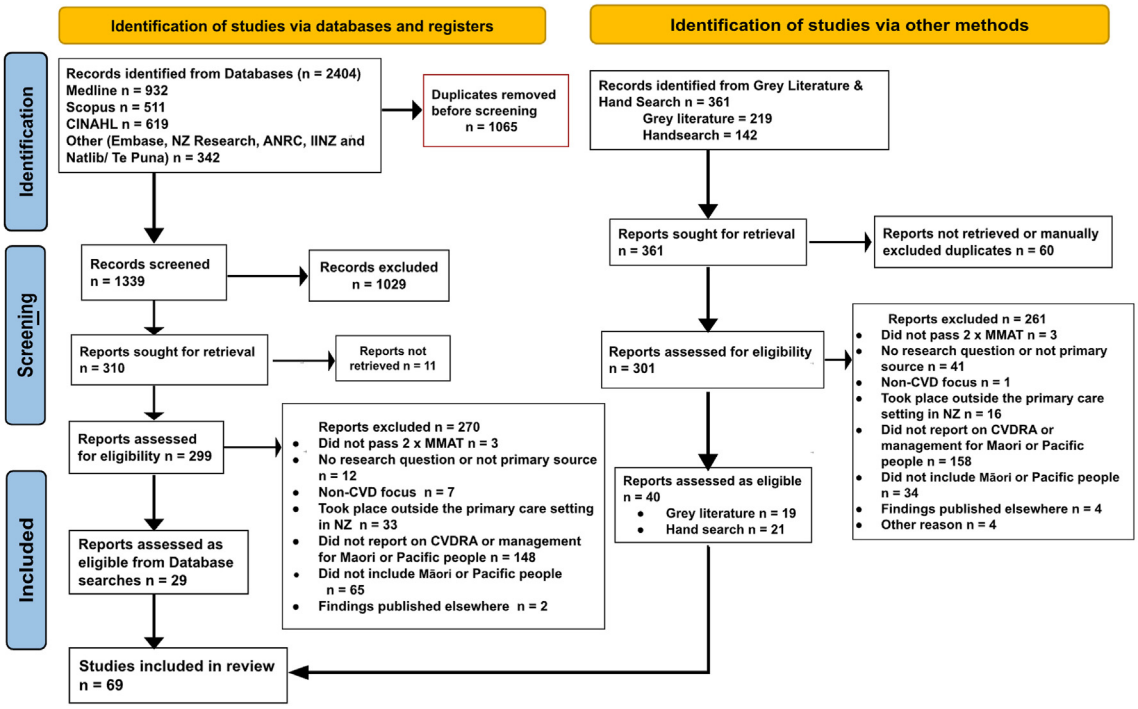

Fig. 1: PRISMA diagram depicting the systematic review search process.

Quality assessment

Forty-four texts (64%) were ≥80% compliant with the MMAT, 12 texts (17%) were 60% compliant with the MMAT, and 13 texts (19%) were ≤40% compliant with the MMAT criteria for quality assessment. Details on quality assessment for each text have been provided in Appendix 6. The exclusion of studies with MMAT compliance ≤40% would exclude studies looking at differences in access to cardiac rehabilitation programmes, however, would not have a significant impact on the other findings of this review which are supported by studies with ≥60% MMAT compliance. Two studies did not pass the MMAT screening questions,[35,36] and both RCTs included in the review were of low quality due to risk of observation bias and selection bias.[37,38] Four mixed methods studies were of low quality,[39–42] and the main quality issues with the remaining five non-randomised quantitative studies were risk of information bias, selection bias, and confounding.[43] Details on quality assessment for each included study are available in Appendix 7.

CONSIDER reporting

Nineteen texts (28%) reported on 0 of the CONSIDER criteria, 30 texts (43%) reported on 1–2 criteria, 9 texts (13%) reported on 3–4 criteria, 2 texts (3%) reported on 5–6 criteria, and 9 texts (13%) reported on 7–8 of the CONSIDER criteria.

Seventeen studies (25%) reported on Governance, 42 studies (61%) reported on Prioritisation, 21 studies (30%) reported on Relationships, 13 studies (19%) reported on Methodologies, 15 studies (22%) reported on Participation, nine studies (13%) reported on Capacity, 28 studies (41%) reported on Analysis and Interpretation, and six studies (9%) reported on Dissemination. Factors associated with reporting of the CONSIDER criteria are presented in Appendix 4. Table 3 presents studies based on their MMAT and CONSIDER scores.

Evidence for gaps in CVDRA and management in primary care have been categorised according to administration of CVDRA, primary prevention, secondary prevention, access to cardiac investigations and interventions, and factors contributing to gaps in each of these areas. The quantitative gaps in CVDRA and management have been summarised in Table 4 and further details on each of the studies are available in Appendix 3.

Discussion of factors contributing to gaps in cardiovascular risk assessment and management

Prior medication adherence,[59] positive framing of CVD risk using pictures,[82] and accurate documentation of smoking status and prior CVD in PREDICT[79,81] were identified to contribute to CVDRA and management for Māori and Pacific peoples. Various interventions for improvement of CVD risk management were identified. An anti-hypertensive adherence intervention at Pacific general practices led to improved medication possession and a trend towards improved blood pressure control.[40]

	Number of studies	CONSIDER score 0/8	CONSIDER score 1–2	CONSIDER score 3–4	CONSIDER score 5–6	CONSIDER score 7–8
	69	19 (28%)	30 (43%)	9 (13%)	2 (3%)	9 (13%)
MMAT Score						
MMAT ≥ 80%	44	13 (30%)	15 (34%)	7 (16%)	2 (5%)	7 (16%)
MMAT = 60%	12	5 (42%)	7 (58%)	0 (0%)	0 (0%)	0 (0%)
MMAT ≤ 40%	13	1 (8%)	8 (62%)	2 (15%)	0 (0%)	2 (15%)

n (% of row total).

Table 3: **MMAT compliance and CONSIDER scoring.**

A polypill could increase adherence to combination therapy, with an RCT finding that CVD polypill therapy led to increased use of recommended medications in high-risk Māori and non-Māori at 12 months.[38] Primary care nurses showed deficits in CVD risk factor knowledge.[80]

Thematic synthesis and discussion of factors contributing to gaps in cardiovascular risk assessment and management from qualitative and mixed methods studies

Twelve qualitative and six mixed methods studies provided qualitative data on factors contributing to gaps in CVDRA and management. The thematic synthesis results are presented in Table 5, with an expanded table including quotations available in Appendix 6. These have been summarised according to the key themes of Provision of Adequate Health Literacy, Relationships with Providers and Whānau, Access to Care, and Cultural Appropriateness and Safety of Care. Health providers carry a responsibility to improve CVD health literacy for Māori and Pacific peoples, including provision of quality information.[62,83–88] Health literacy interventions and cardiac rehabilitation programmes appear to be effective and could be targeted to areas of CVD knowledge deficit including fatalistic beliefs, understanding the preventive purpose of medications, and hesitancy to take medications when feeling well.[62,65,84,86–91] Māori and Pacific peoples conveyed proactive attitudes and willingness to engage in CVD care.[65,84,85,89,92] Positive relationships and whanaungatanga provided a basis for quality cardiovascular care,[62,83,84,86,87,89,91] while whānau involvement provided support for those engaging with CVD care.[62,84–86,88,89,91] Role modelling to family and community could enhance engagement in CVD care,[84–86,91,93] while negative experiences impacted trust in the healthcare system.[62,83,86,87,90,91] Access to care was affected by limited primary care resources including a lack of funding, insufficient appointment time and limited patient follow-up.[39,41,62,65,84,88,91,93,94] At an individual level, barriers to access were lack of transport, treatment costs, and work, family, or church commitments.[42,62,65,86,89] Manaakitanga and outreach to Māori and Pacific peoples including flexible home-based community programmes and appointments were facilitators of access.[65,85,86,90,91,93] A multidisciplinary approach with co-location of staff and good relationships within the healthcare team had a positive impact on CVD care.[39,88,94] Finally, the cultural appropriateness and safety of care was an important factor identified by qualitative studies, with patient-provider ethnicity matching proving effective for Māori and Pacific peoples.[84–86,88,89,94] Communication in a patient's native language could improve cultural safety and communication in cardiovascular care.[42,84,86,88,89] Some Māori and Pacific peoples expressed a desire for incorporation of cultural practices and holistic care in their CVD journey.[62,83,86,91] The need to improve cultural safety and understanding among healthcare professionals was identified.[62,83,85,86,90,93] Racism was a prominent barrier to care for Māori and Pacific patients when experienced from healthcare professionals.[39,41,42,83,86,88,91,92]

Discussion

The summation of quantitative and qualitative data in this review highlights broad inequities in cardiovascular care for Māori and Pacific peoples in the New Zealand primary care system, and factors contributing to these inequities have been identified. This evidence may inform clinicians, policymakers, and society to influence progress towards equitable cardiovascular care for Māori and Pacific peoples in NZ.[76] The studies included in this review indicate that the 90% CVDRA target is not being met for Māori and Pacific peoples,[43,46,47,49–52,59] correlating with national and regional health system reports from 2012 to 2022 that indicate consistent under-assessment of Māori compared to the overall population, and a need for more consistent recording of CVDRA rates in Pacific peoples.[95–118] In annual regional reports, rates of CVDRA for Pacific peoples in Capital Coast District Health Board (DHB) were higher than those in the overall population, reflecting the findings of Mischewski et al. in this review,[36] but CVDRA in other regions was generally lower for Pacific peoples compared to the overall population, noting that only 7 of 20 DHBs included Pacific CVDRA in their annual reports. Four of 20 DHBs did not report on rates of CVDRA in their

Administration of guideline recommended CVDRA

Paper	Outcome	Summary of ethnic gaps	MMAT	CONSIDER
Exeter 2015[44]	Lipid screening	Pacific peoples ≤25 years were 8% more likely to be lipid screened than Europeans, while Māori were equally likely.	100%	1/8
Moss 2011[45]	Lipid screening	Pacific peoples ≥30 years were 5% more likely to be lipid screened than Europeans, while Māori were equally likely.	60%	2/8
Gu 2013[43]	Baseline CVDRA	Pacific women had 9% higher CVDRA (65%) than Pacific men (56%).	80%	2/8
Gu 2014[46]	Baseline CVDRA	Māori had 8% lower CVDRA (46%) than NMNP (54%) and Pacific peoples (60%).	80%	2/8
White 2009[47]	CVDRA rates	Māori had lower CVDRA (76.6%) than non-Māori (85.4%).	80%	4/8
Sheridan 2024[48]	CVDRA rates	CVDRA rates were 238 per 1000 in Māori practices compared to 211 per 100 in non-Māori practices.	80%	3/8
Sheridan 2023[49]	CVDRA rates	Māori practices had mid-range, and Pacific practices had the highest rates of CVDRA compared to other models (specific rates not reported).	80%	2/8
Waldron 2009[50]	CVDRA rates	Māori and Pacific peoples had 6% lower CVDRA (65%) than the overall rates for all ethnicities (71%).	80%	0/8
Sinclair 2006[51]	Post-intervention CVDRA rates	Post-intervention CVDRA was lower in Māori (40.5%) and Pacific peoples (47.6%) compared to Europeans (59.8%).	60%	0/8
Whittaker 2006[52]	Post-PREDICT CVDRA rates	Māori had 4.2% higher post-PREDICT rates of CVDRA (14.7%) compared to non-Māori (10.5%).	40%	2/8
Leow 2011[39]	CVDRA rates	CVDRA rates were 45% in Māori & Pacific men.	40%	1/8
Na'ama 2018[53]	CVDRA rates	CVDRA increased by 8.4% for Pacific peoples from 2014 to 2017, from 80.7% to 89.1%.	20%	1/8
Mischewski 2019[36]	CVDRA rates	CVDRA in Pacific peoples increased from 64.1% in 2012 to 83.0% in 2018.	0%	3/8
Hooper 2016[41]	CVDRA rates	The measured gap in CVDRA between Māori and non-Māori grew from 0.7% in 2012 to 4% in 2016.	0%	1/8

Differences in behavioural support, including green prescription referrals and smoking cessation support

Paper	Outcome	Summary of ethnic gaps	MMAT	CONSIDER
Bay 2015[54]	Stroke knowledge & risk factors	Māori were 0.6 (0.4–0.9) times and Pacific peoples were 0.2 (0.1–0.3) times as likely to have awareness about stroke; Māori were 0.4 (0.2–0.7) times and Pacific peoples were 0.3 (0.2–0.6) times as likely to suggest urgent medical attention for stroke symptoms compared to NZEO.	80%	2/8
Sinclair 2006[51]	Post-intervention lifestyle advice	Compared to high CVR Europeans (49%), Māori (59%) and Pacific peoples (66%) had higher rates of receiving lifestyle advice.	60%	0/8
Croteau 2006[55]	Physical activity advice & green prescription	Māori were 2.70 (1.66–3.76) times and Pacific peoples 1.77 (1.03–3.01) times as likely to receive physical advice compared to NZE. Māori were 2.78 (1.33–5.80) times as likely to have green prescription compared to NZE.	60%	0/8
Williams 2017[37]	Attrition rates in a green prescription programme	Attrition rates were higher in Māori (49%) compared to NZE (24%) in a green prescription programme.	40%	7/8
Leow 2011[39]	CVD health literacy	32% of Māori and Pacific men had knowledge of blood pressure, 45% had knowledge of MI, 23% had knowledge of stroke, 28% had knowledge of cholesterol, and 75% had knowledge of diabetes.	40%	1/8

Differences in prescription and use of antiplatelet or anticoagulant medications for primary prevention

Paper	Outcome	Summary of ethnic gaps	MMAT	CONSIDER
Peiris 2008[56]	Antiplatelet prescription in high CVR	Overall antiplatelet prescription rates were 63.5% in high CVR patients with no significant ethnic differences.	100%	3/8
Ranta 2023[20]	Pre-stroke anticoagulation	Māori had 10% higher rates of pre-stroke anticoagulation (75%) compared to non-Māori (65%) (p = 0.06).	100%	1/8
Tomlin 2017[21]	Anticoagulation or aspirin use in AF with high thromboembolic risk	Māori with AF at high thromboembolic risk were 1.29 (1.13–1.48) times as likely to be anticoagulated compared to Europeans, while Pacific peoples were equally likely to be anticoagulated.	100%	0/8
Wells 2022[57]	Anticoagulation in ≥65 with no CVD	Māori ≥ 65 with diabetes were 1.27 (1.18–1.36) times and Pacific peoples with diabetes were 1.40 (1.30–1.51) times as likely to be anticoagulated compared to Europeans. Māori without diabetes were 1.19 (1.14–1.24) times and Pacific peoples were equally likely to be anticoagulated compared to Europeans.	100%	0/8
Poppe 2018[19]	Anticoagulation and aspirin in those with AF and high thromboembolic risk or high CVR	High thromboembolic risk Māori with AF had higher rates of anticoagulation (54%) compared to Pacific peoples (52%) and Europeans (47%). Māori (56%) and Pacific peoples (55%) at high CVR with AF had lower rates of aspirin compared to non-Māori (58%).	80%	1/8
Sinclair 2006[51]	Aspirin prescription in high CVR post-intervention	Rates of aspirin prescription in high CVR were lower in Māori (32%) and Pacific peoples (25%) compared to Europeans (37%) post-intervention.	60%	0/8
Gu 2018[18]	Anticoagulant prescription in AF	NMNP with AF had higher anticoagulation prescription rates (58%) compared to Māori (54%) and Pacific peoples (50%) (p = 0.07).	60%	2/8
Selak 2016[38]	Baseline antiplatelet prescription in high CVR	Rates of baseline antiplatelet prescription were 64% in Māori and 65% in non-Māori (p = 0.83).	40%	1/8
Walker 2014[58]	New diagnoses of AF and potential benefit from new intervention	3% of AF-screened Māori and Pacific patients could have potentially benefitted from new intervention. Thromboembolic risk was unreported.	40%	1/8

Differences in prescription and use of antihypertensive medications for primary prevention

Paper	Outcome	Summary of ethnic gaps	MMAT	CONSIDER
Peiris 2008[56]	Antihypertensive prescription in high CVR	Māori at high CVR were 3.63 (1.64–8.08) (p = 0.02) and Pacific peoples were 2.67 (1.25–5.70) (p = 0.01) times as likely to have antihypertensive prescription compared to NZEO.	100%	3/8

(Table 4 continues on next page)

Differences in prescription and use of antihypertensive medications for primary prevention

Paper	Outcome	Summary of ethnic gaps	MMAT	CONSIDER
(Continued from previous page)				
Wells 2022[57]	Antihypertensive prescription in patients ≥65 years with high CVR	Māori with diabetes were 1.40 (1.27–1.56) times and Pacific peoples with diabetes were 1.23 (1.11–1.36) times as likely to have antihypertensives compared to Europeans. Māori without diabetes were 1.16 (1.12–1.20) times and Pacific peoples were 0.88 (0.84–0.92) times as likely to be on antihypertensives compared to Europeans.	100%	0/8
Warren 2014 Prescription ...[59]	Antihypertensive prescription	28% of Pacific patients had at least 1 antihypertensive prescription in the past 5 years. Those who initially persisted were 8.05 (3.07–21.12) times as likely to have high adherence compared to those with initial lapse.	80%	2/8
Gu 2014[46]	Antihypertensive prescription & adherence in high CVR.	Māori (80%) and Pacific peoples (82%) had higher rates of antihypertensive prescription than NMNP (79%). Antihypertensive adherence was lower in Māori (59%) and Pacific peoples (57%) compared to in NMNP (64%).	80%	2/8
Faatoese 2011[13]	Antihypertensive use in high CVR, CVD or diabetes	50% of Māori with high CVR, CVD or diabetes were on antihypertensive agents and 33% had adequate BP control.	80%	7/8
Gu 2013[43]	Antihypertensive adherence ≥80%	67% of Pacific peoples on antihypertensives had high adherence (MPR ≥ 80%).	80%	2/8
Sinclair 2006[51]	Antihypertensive in high CVR post-intervention	High CVR Māori had higher antihypertensive prescription rates (68%) than Pacific peoples (57%) and Europeans (54%).	60%	0/8
Warren 2012[40]	Antihypertensive possession in intervention vs control	The intervention was estimated to improve antihypertensive adherence (MPR) by 12.07% (p = 0.0002).	20%	4/8
Selak 2016[38]	Baseline antihypertensive in high CVR	Non-Māori had higher rates of baseline antihypertensive prescription (90%) compared to Māori (85%) and higher rates of dual blood-pressure-lowering therapy (56%) compared to Māori (49%).	40%	1/8

Differences in prescription and use of lipid-lowering medications for primary prevention

Paper	Outcome	Summary of ethnic gaps	MMAT	CONSIDER
Peiris 2008[56]	Lipid-lowering prescription in high CVR	Lipid-lowering prescription was 71.9% in high CVR patients with no significant ethnic differences.	100%	3/8
Wells 2022[57]	Lipid-lowering prescription in patients ≥65 with high CVR	Māori with diabetes were 1.30 (1.19–1.41) times and Pacific peoples were 1.41 (1.29–1.54) times as likely to have lipid-lowering prescription compared to Europeans. Māori without diabetes were both 1.08 (1.05–1.12) and Pacific peoples were 1.08 (1.02–1.14) times as likely to have lipid-lowering prescription compared to Europeans.	100%	0/8
Gu 2014[46]	Cholesterol-lowering prescription and adherence in high CVR	No significant ethnic differences in rates of cholesterol lowering prescription in Māori (70%), Pacific peoples (73%) and NMNP (72%). Māori at high CVR had significantly lower rates of high adherence (40%) compared to Pacific peoples (45%) and NMNP (48%).	80%	2/8
Warren 2014 Prescription[59]	Cholesterol-lowering prescription and adherence	22% of Pacific peoples ≥20 had at least 1 cholesterol lowering prescription in the past 5 years. Those who initially persisted were 4.17 (1.63–10.71) times as likely to have high adherence compared to those with initial lapse.	80%	2/8
Faatoese 2011[13]	Lipid-lowering therapy in Māori with hypercholesterolaemia	58% of Māori with hypercholesterolaemia were on lipid-lowering therapy and 67% were meeting TC: HDL targets.	80%	7/8
Gu 2013[43]	High adherence to cholesterol-lowering therapy in high CVR	48% of Pacific peoples on cholesterol-lowering therapy had adequate adherence (MPR ≥80%).	80%	2/8
Norris 2014[60]	Statin dispensing	Māori were slightly more likely to be prescribed a statin than non-Māori until 65–74 years (exact figures not reported), after which they were slightly less likely.	80%	1/8
Sinclair 2006[51]	Statin prescription in high CVR post-intervention	Post-intervention, Māori (42%) and Pacific peoples (43%) had statin prescription rates 3–4% higher than Europeans (38%).	60%	0/8
Gribben[61]	Increase in statin prescription following One Heart Many Lives campaign	There was an expected increase in statin prescribing of 6.4 per 1000 population in Māori and 17 per 1000 population in Pacific peoples following One Heart Many Lives in Porirua & Gisborne.	60%	2/8

Differences in prescription and use of combination or triple therapy for primary prevention

Paper	Outcome	Summary of ethnic gaps	MMAT	CONSIDER
Peiris 2008[56]	Triple therapy in high CVR	Rates of triple therapy in high CVR patients were 50.3% with no significant ethnic differences.	100%	3/8
Gu 2016[62]	Antihypertensive, cholesterol or oral diabetic prescription	18% of high CVR Māori had no antihypertensive, cholesterol or oral diabetic prescription in the past 2 years.	40%	2/8
Faatoese 2011[13]	Dual therapy (lipid-lowering & antihypertensives) in Māori with T2DM	Over one-third of Māori with T2DM were receiving dual therapy with lipid-lowering & antihypertensive medications at screening.	80%	7/8
Sinclair 2006[51]	Rates of meeting all management advice in high CVR post-intervention	High CVR Māori (9%) and Pacific peoples (11%) had higher rates of meeting all management advice than Europeans (5%) post-intervention.	60%	0/8
Elley 2008[63]	Dual therapy (antihypertensive & lipid-lowering) prescription in T2DM	Overall, Māori were 1.05 (1.01–1.09) and Pacific peoples were 1.07 (1.03–1.12) times as likely to receive combination therapy compared to Europeans.	60%	1/8
Warren 2014 Cluster ...[64]	Baseline adherence to triple therapy in high CVR	Baseline adherence to triple therapy was low (11%) in high CVR Pacific patients and CDM was largely ineffective at improving adherence.	60%	2/8

(Table 4 continues on next page)

Differences in prescription and use of combination or triple therapy for primary prevention

Paper	Outcome	Summary of ethnic gaps	MMAT	CONSIDER
(Continued from previous page)				
Selak 2016[38]	Baseline triple therapy in high CVR	High-CVR Māori had lower rates of triple therapy (53%) compared to non-Māori (55%) (p = 0.76) and Māori had lower rates of combination therapy with 2 BPLs (28%) compared to non-Māori (38%) (p = 0.08).	40%	1/8

Differences in access to cardiac rehabilitation programmes

Paper	Outcome	Summary of ethnic gaps	MMAT	CONSIDER
Lesatele 2014[65]	Cardiac rehab programme completion	In 2 of 3 cardiac rehab programmes, <50% of referred Māori or Pacific peoples completed the programme.	20%	3/8
Southwick 2012[42]	Proportion of Pacific peoples in a CVD programme	From 2003 to 2011, the proportion of Pacific peoples in a CVD chronic care management programme decreased from 36.4% to 18.1%.	40%	8/8

Differences in prescription and use of antiplatelet medications for secondary prevention

Paper	Outcome	Summary of ethnic gaps	MMAT	CONSIDER
Kerr 2016[23]	Likelihood of aspirin maintenance 3 years post-ACS discharge	Following ACS, Māori were 39% less likely and Pacific peoples were 54% less likely to be maintained on aspirin at 3 years post-discharge compared to Europeans.	100%	0/8
Mehta 2015[66]	Clopidogrel dispensing post-PCI	Māori were 0.86 (0.76–0.97) times as likely and Pacific peoples were equally likely be dispensed clopidogrel prior to SA removal compared to Europeans. This did not appreciably change after SA removal.	100%	0/8
Denison 2023[67]	Post-stroke antiplatelet & anticoagulant prescription at 12 months	Post-stroke, Māori were 0.53 (0.42–0.62) and Pacific peoples were 0.66 (0.50–0.87) times as likely to have antiplatelet prescription compared to Europeans. All were equally likely to have anticoagulant prescription.	100%	1/8
Wells 2022[57]	Antithrombotic prescription in patients ≥65 with CVD	Māori ≥ 65 with CVD 1.05 (1.01–1.10) times and Pacific peoples 0.93 (0.87–0.99) times as likely to have antithrombotic prescription compared to Europeans.	100%	0/8
Riddell 2007[68]	Anticoagulant therapy in known CVD	Māori with CVD were equally likely to be taking anticoagulants compared to non-Māori OR 1.43 (0.96–2.17).	80%	2/8
Sinclair 2006[51]	Aspirin prescription in known CVD post-intervention	In those with CVD, 76% of Europeans, 73% of Pacific peoples and 69% of Māori had aspirin prescribed post-intervention.	60%	0/8
Hart 2023[69]	Anticoagulants & antiplatelet use post-PAD intervention	Post-PAD intervention, antiplatelet use was 76.5% in Māori and 81% in non-Māori (p = 0.022). Anticoagulant use was 18.4% in Māori and 20.5% in non-Māori (p = 0.278).	60%	0/8

Differences in prescription and use of antihypertensive medications for secondary prevention

Paper	Outcome	Summary of ethnic gaps	MMAT	CONSIDER
Denison 2023[67]	Post-stroke antihypertensive prescription at 12 months	Post-stroke, Māori were 0.75 (0.62–0.91) and Pacific peoples were equally likely to have antihypertensive prescription compared to Europeans.	100%	1/8
Riddell 2007[68]	Anti-hypertensive prescription in known CVD	Māori with CVD were 1.60 (1.06–2.48) times as likely to be prescribed anti-hypertensives compared to non-Māori.	80%	2/8
Sinclair 2006[51]	Anti-hypertensive prescription in known CVD post-intervention	40% of Māori, 39% of Pacific peoples and 48% of Europeans with CVD were prescribed a beta blocker. 67% of Māori, 58% of Pacific peoples and 47% of Europeans had an ACE inhibitor prescribed.	60%	0/8
Mehta 2011[70]	Blood pressure-lowering therapy in known CVD	81% with CVD were prescribed blood pressure-lowering therapy with no significant ethnic differences.	60%	0/8
Hart 2023[69]	Antihypertensive use post-PAD intervention	Post-PAD intervention, antihypertensive use was 84.5% in Māori and 79.7% in non-Māori (p = 0.014).	60%	0/8

Differences in prescription and use of lipid-lowering medications for secondary prevention

Paper	Outcome	Summary of ethnic gaps	MMAT	CONSIDER
Kerr 2016[23]	Statin maintenance 3 years post-ACS discharge	Post-ACS, Māori were 32% less likely and Pacific peoples were 48% less likely to be maintained on a statin at 3 years compared to Europeans.	100%	0/8
Muniandy 2021[71]	Statin prescription 12 months post-ACS	50.8% of Māori and 53.7% of Pacific patients post-ACS had ideal statin MPRs ≥ 1, compared to 62.5% of European/Others.	100%	0/8
Liao 2023[72]	Statin adherence 6–18 months post-ACS discharge	Māori were 1.34 (1.25–1.44, p < 0.01) times and Pacific peoples were 1.29 (1.16–1.43, p < 0.01) times as likely to have low statin adherence (MPR < 80%) compared to other ethnicities.	100%	0/8
Denison 2023[67]	Statin prescription 12 months post-stroke	Māori were 0.70 (0.58–0.86) times as likely to be prescribed a statin and Pacific peoples were equally likely compared to Europeans.	100%	1/8
Wells 2022[57]	Lipid-lowering dispensing in people ≥65 with known CVD	Māori ≥ 65 with CVD were 0.92 (0.89–0.96) and Pacific peoples were 1.08 (1.01–1.15) times and Pacific peoples were equally likely to be prescribed a lipid-lowering agent compared to Europeans.	100%	0/8
Mehta 2016[73]	Statin dispensing before and after atorvastatin SA criteria removal	Māori were 0.57 (0.47–0.68) times and Pacific peoples were 0.45 (0.34–0.60) times as likely to receive atorvastatin compared to other ethnicities. After SA removal Māori were 0.79 (0.72–0.89) times as likely to receive atorvastatin compared to other ethnicities.	80%	1/8
Riddell 2007[68]	Lipid-lowering prescription in known CVD	Māori with CVD were equally likely to be prescribed lipid-lowering agents (OR 1.04 (0.72–1.50)) compared to non-Māori.	80%	2/8

(Table 4 continues on next page)

Differences in prescription and use of lipid-lowering medications for secondary prevention

Paper	Outcome	Summary of ethnic gaps	MMAT	CONSIDER
(Continued from previous page)				
Thornley 2011[14]	Statin dispensing 12 months post-ACS discharge	In those with statin prescription prior to an acute coronary event, Māori were 0.71 (0.56–0.89) times as likely to have an optimal statin dispensing ratio compared to other ethnicities at 12 months.	80%	0/8
Grey 2014[74]	Statin maintenance at 1- and 3-years post-ACS discharge	Māori were 0.88 (0.84–0.92) and Pacific peoples were 0.82 (0.76–0.89) times as likely to have an MPR ≥ 80% at 1-year compared to Europeans. Māori were 0.87 (0.83–0.92) and Pacific peoples were 0.82 (0.75–0.90) times as likely to have an MPR ≥ 80% at 3 years compared to Europeans.	80%	1/8
Sinclair 2006[51]	Statin prescription post-intervention in known CVD	69% of Māori, 79% of Pacific peoples and 61% of Europeans with CVD were prescribed a statin post-intervention.	60%	0/8
Mehta 2011[70]	Lipid-lowering dispensing in known CVD	Lipid-lowering medications were dispensed in 73% of patients with known CVD with no significant ethnic differences.	60%	0/8
Chan 2020[35]	Statin dispensing in known CVD	66% of Māori with CVD had statin dispensing in the last 4 months of 2019 compared to 71% of Pacific peoples and 70% of European/Others.	40%	0/8
Hart 2023[69]	Lipid-lowering therapy post-PAD intervention	Post-PAD intervention, lipid-lowering use was 77.8% in Māori compared to 77.3% in non-Māori (p = 0.79).	60%	0/8
Moss 2011[45]	Lipid monitoring	Pacific peoples with CVD were 2% more likely to have lipid monitoring than Europeans.	60%	2/8

Differences in prescription and use of combination or triple therapy for secondary prevention

Paper	Outcome	Summary of ethnic gaps	MMAT	CONSIDER
Riddell 2007[68]	Triple therapy in known CVD	Māori with CVD were equally likely (1.24 (0.87–1.77) to be prescribed triple therapy compared to non-Māori.	80%	2/8
Faatoese 2011[13]	Dual therapy (lipid-lowering & antihypertensives) in known CVD	50% of patients with CVD were receiving lipid-lowering & antihypertensive therapy.	80%	7/8
Kerr 2014[75]	Triple therapy maintenance in known CVD	Māori were 0.97 (0.96–0.99) times as likely and Pacific peoples were 1.04 (1.01–1.06) times as likely to be adequately maintained on triple therapy compared to European/Others.	80%	0/8
Sinclair 2006[51]	Post-intervention rates of meeting all management advice in known CVD	17% of Māori, 15% of Pacific peoples, and 6% of Europeans with CVD met all management advice post-intervention.	60%	0/8
Elley 2008[63]	Dual therapy (lipid-lowering & antihypertensives) in known CVD	Of those with known CVD, 68.2% of Māori, 70% of Pacific peoples and 66.2% of Europeans were on dual therapy.	60%	1/8
Chan 2020[35]	Triple therapy in known CVD	53% of Māori with CVD were on triple therapy in 2019, compared to 59% of Pacific peoples and 56% of European/Others.	40%	0/8

Differences in referrals for, and provision of, cardiovascular investigations and interventions

Paper	Outcome	Summary of ethnic gaps	MMAT	CONSIDER
Curtis 2010[76]	Angioplasty, angiography & CABG in known CVD	Māori were 1.36 (1.32–1.41) times as likely to receive angiography compared to non-Māori and 0.88 (0.82–0.95) times as likely to receive angioplasty. Māori were 1.21 (1.13–1.30) times as likely to receive CABG compared to non-Māori.	80%	3/8
Riddell 2007[68]	Revascularisation (PCI or CABG) in known CVD	Māori with IHD were 0.46 (0.34–0.83) times as likely to receive revascularisation (PCI or CABG) compared to non-Māori.	80%	2/8
Sandiford 2015[34]	Expected PCI/CABG rates based on STEMI hospitalisation rates	From 2009 to 2012 Māori men received 0.74 (0.69–0.79) times the expected number of PCI procedures based on STEMI hospitalisations and Pacific men had 0.78 (0.710.85) the expected number. Māori women received 0.72 (0.65–0.79) times and Pacific women had 0.68 (0.57–0.80) times the expected number of PCI procedures based on STEMI rates.	60%	2/8
Westbrooke 2001[77]	Cardiac intervention in CVD	Rates of cardiac intervention (CABG, PCI or invasive cardiac investigation) for Māori were one-third to one-half of those for other ethnicities.	60%	1/8
Tukuitonga 2002[78]	Revascularisation access in known CVD.	Pacific men were 0.64 and Māori men were 0.40 times as likely to have CABG compared to other men. Pacific women were 0.73 and Māori women were 0.74 times as likely to have CABG compared to other women. Pacific men were 0.25 and Māori men were 0.29 times as likely to have PTCA compared to other men. Pacific women were 0.21 and Māori women were 0.43 times as likely to have PTCA compared to other women.	20%	1/8

Discussion of factors contributing to gaps in cardiovascular risk assessment and management

Paper	Outcome	Contribution of discussion of factors	MMAT	CONSIDER
Wells 2018[79]	Concordance in CVD hospitalisation and PREDICT records	Māori were 1.12 (1.12–1.30) times and Pacific peoples were 1.62 (1.49–1.76) times as likely to have a prior CVD hospitalisation not recorded in PREDICT. Patients with discordance had lower rates of prescription for all CVD medications.	100%	0/8
Daly 2012[80]	Nurse knowledge of CVD risk factors	All nurse groups displayed a lack of knowledge about CVD risk factors, particularly smoking, lipid profiles & complications of CVD.	100%	0/8
Selak 2006[81]	Smoking status recording	Māori were 1.78 (1.40–2.20) times as likely to have smoking status recorded compared to non-Māori.	80%	0/8
Warren 2014 Prescription ... [59]	Adherence to CVD medications	Adherence to antihypertensive, cholesterol-lowering, and oral antidiabetics was more likely in those who started medications prior to the run-in period. Those who persisted with initial treatment were more likely to adhere compared to those who lapsed during their first prescription, who had a high risk of long-term non-adherence.	60%	2/8

(Table 4 continues on next page)

Discussion of factors contributing to gaps in cardiovascular risk assessment and management

Paper	Outcome	Contribution of discussion of factors	MMAT	CONSIDER
(Continued from previous page)				
Raval 2015[82]	Preferences in CVD risk discussion	Māori and Pacific peoples preferred pictures to numbers when presenting information and all preferred the 100-person chart to the bar chart. Pacific peoples were more likely to prefer doctor-led decisions; other ethnicities tended to prefer shared decision-making.	60%	0/8
Selak 2016[38]	Effect of polypill therapy on medication use	Māori using a polypill were 1.18 (1.06–1.32) times as likely to be using an antiplatelet, 1.08 (1.00–1.17) times as likely to be using an antihypertensive, 1.87 (1.50–2.34) times as likely to be using combination therapy with 2 BPLs and 1.27 (1.10–1.48) times as likely to be using triple therapy at 12 months compared to usual care.	40%	1/8
Warren 2012[40]	Effect of an intervention on adherence to antihypertensives	An antihypertensive adherence intervention had an estimated effect of 12.07% on MPR and was seen as beneficial by Pacific patients, although providers had concerns about sustainability.	20%	4/8

ACS = Acute Coronary Syndrome; AF = Atrial Fibrillation; BP = Bloods Pressure; CVDRA = Cardiovascular Disease Risk Assessment; High CVR = High Cardiovascular Risk (≥15%); MPR = Medication Possession Ratio; NMNP = Non-Māori, Non-Pacific; NZE = New Zealand Europeans; NZEO = New Zealand Europeans and Other ethnicities; PAD = Peripheral Arterial Disease; PCI = Percutaneous Coronary Intervention; PTCA = Percutaneous Transluminal Coronary Angioplasty; SA = Special Authority.

Table 4: **Quantitative gaps in CVD risk assessment and management in Māori and Pacific peoples in NZ, categorised by outcome.**

annual reports.[95–118] It is suggested that Māori general practices have higher rates of CVDRA than other models of general practice in New Zealand.[48,49] This review suggests that lipid screening needs to be improved to facilitate CVD screening, although Pacific peoples were more likely to be screened than Māori and Europeans.[44,45] Two evaluations of large national CVD campaigns were of low quality, and the 'More Heart and Diabetes Checks' recommended implementation of equity-sensitive funding and targets, but these have not been introduced.[41] The 'One Heart Many Lives' campaign was a significant national campaign for improving CVDRA and management for Māori and Pacific men, but a lack of in-built evaluation mechanisms limited its ability to inform future progress.[39]

Gaps in the provision of equitable health literacy for Māori and Pacific peoples were evident.[39,54,65,83,84,87,88] Although in two studies Māori and Pacific peoples were more likely to receive lifestyle or physical activity advice than Europeans,[50,54] interventions focused on lifestyle changes for primary and secondary prevention did not fully engage with Māori and Pacific peoples, with high rates of non-completion in two programmes.[37,65]

Antiplatelet therapy as primary CVD prevention is no longer recommended, with two studies indicating no significant ethnic differences in those with high CVR[38,56] and a further two studies indicating lower rates of antiplatelet therapy in Māori and Pacific peoples.[19,51] Māori and Pacific peoples clearly have a higher incidence of AF

Strengths/Enablers	Barriers
Provision of Adequate Health Literacy[39,62,65,84–92]	
• Māori and Pacific patients conveyed proactive attitudes and willingness to engage in CVD care. Previous experience of CVD contributed to understanding. • Health literacy interventions and rehabilitation programmes appeared to be helpful for patients and providers.	• Quality information about CVD was not always provided. • Patients did not always understand the need to take CVD medications when feeling well. • Some patients believed that factors such as stress and genetics determined their CVD health.
Relationships with providers and Whānau[62,83–87,89–91,93]	
• Whānau involvement and support strengthened CVD care. • A positive relationship and whanaungatanga with healthcare providers facilitated CVD care. • Role modelling to family and community could enhance engagement in CVD care.	• Negative experiences impacted Māori and Pacific peoples' trust in the healthcare system.
Access to care[39,41,42,62,65,84–86,88–91,93,94]	
• A multidisciplinary approach with co-location of staff and good relationships within the healthcare team had a positive impact on access to CVD care. • Care that focused on manaakitanga, community, and outreach to Māori and Pacific peoples was considered to improve access to CVD care.	• Insufficient funding and the cost of accessing care were barriers to accessing CVD care. • Healthcare providers felt stretched and insufficient time was a barrier to providing high quality CVD care. • Lack of follow-up was a barrier to accessing CVD care. • Lack of transport was a barrier to accessing CVD care. • Work, whānau and church commitments prevented some patients from accessing CVD care.
Cultural appropriateness and safety of care[39,41,42,62,83–86,88–94]	
• Matching of patient & provider ethnicities was viewed to improve cultural safety and quality of CVD care. • Communication in a patient's native language facilitated quality CVD care. • A desire for cultural practices and holistic care was expressed by Māori and Pacific peoples.	• The need to improve cultural safety and understanding among healthcare professionals was identified. • Racism was a barrier to CVD care.

Table 5: **Summary of key themes from thematic synthesis.**

at a younger age and higher stroke risk at onset,[18–21] which could explain the higher rates of anticoagulant prescription for Māori and Pacific peoples observed in four studies[19–21,55] with one study observing the opposite.[18] Gaps in adherence to anticoagulation were identified for all ethnicities.[18] Rates of antihypertensive use in primary prevention were generally higher in Māori and Pacific peoples compared to Europeans or non-Māori, non-Pacific peoples,[46,51,56,57] with the exception of one low quality study.[38] Evidence for lipid-lowering therapy in primary prevention suggested no ethnic differences[46,51,56] and in some studies Māori[60] and Pacific peoples were more likely to have statin prescription than Europeans, however rates of statin prescription in high-risk patients appeared to be suboptimal.[13,51] Gaps in adherence to primary CVD prevention with antihypertensive and lipid-lowering therapies were apparent.[13,46,56,64,67,68] Evidence for ethnic differences in combination therapy for primary prevention was mixed.[13,38,51,59,63]

There were gaps in secondary prevention with antiplatelet agents for Māori and Pacific peoples when compared to other ethnicities, including maintenance of aspirin post-ACS,[23] maintenance of clopidogrel post-PCI,[66] post-stroke thromboprophylaxis,[67] and antiplatelet use post-PAD intervention.[69] There was heterogeneity in data on secondary prevention with antihypertensive agents,[51,68–70] but it was suggested that blood pressure control and post-stroke antihypertensive use could be improved for Māori.[13,67] There were gaps in secondary prevention with lipid lowering therapy for Māori and Pacific peoples compared to Europeans, even where initial statin prescribing was high,[14,23,35,57,67,71–74] although ethnic gaps were not observed in all studies.[51,68–70] There were no clear patterns in the use of triple therapy as secondary prevention in Māori and Pacific peoples.[30,35,50,62,63,68,74,75] Inequities in access to coronary revascularisation for Māori and Pacific peoples persisted despite some improvement over time, although research on access to revascularisation could be updated to assess progress over the past decade.[67,68,76–78,119]

Factors contributing to CVDRA and management in primary care were reported in quantitative, qualitative, and mixed methods studies. Access to care was an important factor in CVDRA and management. CVDRA was limited by lack of healthcare provider funding and time needed to implement CVDRA and encourage medication adherence during appointments, with patients working during practice hours and practice staff feeling stretched by high deprivation and health needs.[39,86,93,94] Lack of support for ongoing CVD management, follow-up, and continuity limited preventive efforts.[65,84,85,91] Transport, time, and other commitments were barriers to primary and secondary prevention.[42,62,65,86,89] Factors that increased access to CVD care were a multidisciplinary approach and care focused on manaakitanga, community, and outreach to Māori and Pacific peoples.[39,65,85,86,88,90,91,93,94] A study not included in this review also found that ethnic misclassification in PREDICT was more likely to affect Māori and Pacific peoples and subsequently lead to suboptimal management of CVD risk due to under-assessment and treatment.[120]

Pacific patients at high risk of poor medication adherence generally re-presented for repeat prescription, providing an opportunity for health practitioners to prevent long-term non-adherence.[59] Long-term medications or initial persistence were predictors of good adherence,[59] and an antihypertensive adherence intervention could be beneficial, utilising telephone calls and scheduling of advanced appointments for repeat prescriptions.[40] Medication adherence was affected by delivery of culturally appropriate care in participants' native language, respect within the patient-provider relationship and shared decision-making.[42,84,86,88,89] Barriers to adherence were feeling well, other commitments and the cost of appointments, medications, and transport.[62,65,84,88,89] In this review, Māori and Pacific peoples also expressed a desire for holistic care and incorporation of cultural practices in CVD care.[62,83,86,91] Beyond this review, Māori perspectives and experiences of taking prescribed medicines have been explored. Holistic wellbeing, whanaungatanga (building relationships), knowledge, and whānau advocacy were facilitators of medication use. Reasons for non-adherence echoed the findings of this review, with forgetfulness, adverse effects, lack of symptoms, and not having medications cited as the main reasons. Methods for improving adherence were identified as proactive support from pharmacists, caring therapeutic relationships, sharing knowledge, acknowledging medicines as one part of holistic wellbeing, and giving adherence tips to support routine use of medications.[121] A previous study explored how Māori interacted with medications in the home environment.[122] The five key culturally patterned orientations to enhance use of medications by Māori in the home environment were Māori hygiene practices of tapu, reminder strategies (ngā pūrere whakamāharahara), the value of manaakitanga in care relationships, influences of poverty (poharatanga), and the right to make one's own health and life decisions (rangatiratanga).[122]

An important finding of this review is that Māori and Pacific peoples are not provided equitable levels of CVD health literacy[39,62,65,83–92] which affects primary prevention, secondary prevention, and cultural safety in CVD care. Healthcare providers have a responsibility to improve understanding of CVD among Māori and Pacific peoples.[62,83–86,88] Acknowledging that some patients with experience of CVD had a good understanding of risk factors, Māori and Pacific patients were proactive and willing to engage in CVD care.[65,84,85,89,92] Health literacy interventions could target delivery of quality information, ideas surrounding CVD, the preventive purpose of medications, and emphasise the importance

of taking medications even when feeling well.[39,62,65,84,88,89] A CVD medications health literacy intervention for Māori was seen to be effective due to whanaungatanga, home-based care, tailored educational resources, and adequate timeframes.[87] Patients may appreciate a holistic approach to the CVD risk discussion, where medications form a part of the management plan, and traditional medicines (rongoā) are respected and included in discussions.[62,83,86,91] The importance of whanaungatanga in health literacy for Māori has been previously highlighted, emphasising the importance of reciprocal and responsive relationships, connection, continuity, and collaboration.[122] The Ministry of Health NZ has provided a framework for building health literacy, with a focus on health systems, organisation, health care providers, and shifting the responsibility from individuals and their whānau to healthcare leaders and their workforces.[123] The importance of patient-provider and whānau relationships is seen in this review,[62,93,94] with matching of patient-provider ethnicities enhancing Māori and Pacific engagement in the CVD care pathway.[84–86,88,89] Role modelling and whānau involvement had a strengthening effect on CVD care,[24,84,86,91,93] while negative experiences impacted Māori and Pacific peoples' trust in the healthcare system.[62,86,87,90,91]

A key finding of this review is the need for improved cultural safety across CVD care for Māori and Pacific peoples. Cultural safety is more than being "competent" in the cultures of others and requires healthcare professionals to develop a critical consciousness of themselves and the impact of their own culture on clinical interactions, acknowledging their own biases, attitudes, assumptions, and stereotypes to work towards health equity.[124] Racist attitudes and beliefs affect primary and secondary prevention,[39,42,83,86,88,90–92] and racism and discrimination have a detrimental effect on the health of Māori and Pacific peoples in NZ.[125,126] The impacts of racism on healthcare have been described in terms of institutional racism involving socioeconomic factors, internalised racism affecting health behaviours, and personally mediated racism involving discrimination and differential actions because of a person's race.[127] In this review, personally mediated racism was seen to impact primary and secondary prevention through racist attitudes and beliefs held by healthcare providers.[39,42,83,86,88,90–92] Behaviour of health professionals was a barrier to Māori accessing CVD care and is an example of internalised racism.[42,90] CVDRA services do not always cater to Māori and Pacific peoples,[41,91–93] an example of institutional racism influenced by the wider determinants of access to care.

Ethnic differences in cardiovascular care need to be contextualised within the wider determinants of health.[76,128,129] Māori and Pacific peoples have poorer access to the socioeconomic determinants of health compared to non-Māori, non-Pacific peoples.[130,131] Three key factors affecting cardiovascular inequities in Māori have previously been identified; the role of society, policy, and the clinician.[76] These frame health inequities in the context of colonisation, environment, racism, unequal treatment by society, and worldviews, social status, surface causes, and responses which include behavioural, psychological, and physiological effects on individuals.[131] The factors contributing to inequities are broad and complex and require careful consideration when developing health interventions to improve CVD care for Māori and Pacific peoples.

Strengths of this study include its wide scope, thorough approach to searching, and inclusion of studies of all methodologies from diverse sources. Indigenous perspectives were prioritised through strong Māori and Pacific governance, involvement of researchers from diverse cultural backgrounds, and use of the adapted CONSIDER statement to evaluate quality from an Indigenous perspective. The analysis of CONSIDER provides an evaluation of the current landscape of cardiovascular research involving Indigenous peoples in primary care in NZ. Limitations of this study include the inability to perform a meta-analysis due to the heterogeneity of included studies. Data extraction errors are possible given that data was not extracted by two independent reviewers for all included studies. In the repeat search completed in 2025, four publications identified for potential inclusion were unavailable or abstract-only, and hence could not be included. It is suggested that further publication on this topic can be expected in the near future. The application of CONSIDER to quality assessment of texts published prior to 2019 is a limitation as the CONSIDER statement was only published in 2019.[29] Although some studies were of low quality according to the MMAT, removal of studies with MMAT ≤ 40% would not have a significant impact on findings across outcomes, as indicated in Table 4. Most studies in this review had a low CONSIDER score. Deviations from the original protocol have been discussed and were offset by involvement of at least two independent reviewers in each step of the review. Disaggregation by Māori or Pacific ethnicity was not always practical, and there is a risk of overgeneralisation when combining Māori and Pacific peoples during analysis. Pacific peoples come from a range of different Pacific ethnic groups which are differentially affected by CVD risk factors, and this may have implications for the implementation of targeted interventions.[11] In a small number of studies, it was difficult to ascertain whether management originated in primary care.

This large systematic review adds specific knowledge about already-reported gaps in the cardiovascular primary care pathway for Māori and Pacific peoples in NZ and will contribute to the development of a Quality Improvement Equity Roadmap to improve CVD outcomes for Māori and Pacific peoples.[25,26] Further research into smoking cessation support, access to lifestyle interventions, and referral to cardiovascular

investigations and interventions from primary care would be useful, as this review did not identify any research on these outcomes for Māori and Pacific peoples. More effort and resources need to be directed to achieving the 90% CVDRA target for Māori and Pacific peoples, and primary care practices need to be resourced to assess and manage Māori and Pacific patients at risk of long-term non-adherence in both primary and secondary prevention, with consideration of the wider determinants of health affecting access to care. The cultural safety of primary CVD care for Māori and Pacific peoples may be improved by targeting individual and institutional racism, fostering whanaungatanga in the patient-provider relationship, communication in a patient's first language, and whānau involvement in care. Health literacy and understanding of CVD among Māori and Pacific peoples needs to be improved through dedicated efforts from healthcare leaders and providers to build health literacy. Finally, we suggest that increased education about CONSIDER and discussion of its application to different research methodologies may enhance future reporting. Qualitative research with Māori and Pacific researchers in NZ could explore potential barriers to the implementation of CONSIDER, with the goal of enhancing health research quality and responsiveness to Māori and Pacific peoples in NZ.

Contributors

KMB, CG, JP, JW-S, SH, VS, SA, and MH contributed to conceptualisation, methodology and protocol development. KMB contributed to data curation through completing the initial database searches, screening, and development of grey literature and hand search protocols. AW contributed to data curation and formal analysis by completing the updated database searches, grey literature and hand searches, screening of articles, full text review, data extraction, quality assessment, and writing the original manuscript. J-LR contributed to data curation, formal analysis and supervision through screening, determination of eligibility, oversight of the review, and provision of a Māori perspective in the analysis and interpretation of results. RE-L and SH both contributed to data curation and formal analysis through completing full text review, data extraction, quality assessment, and provision of Pacific perspectives. MH contributed to conceptualisation, data curation, and supervision through refinement of inclusion and exclusion criteria, determination of study eligibility, providing perspective as an experienced Māori GP, and oversight of the review. All authors contributed to reviewing and editing of the draft manuscript, had full access to the data in the study, and approved the manuscript for submission.

Data sharing statement

The systematic review protocol was registered with Open Science Framework https://doi.org/10.17605/OSF.IO/VUDE9. A condensed data extraction table and quality assessment table have been provided in the Appendix of this systematic review. Full data extraction tables will not be made available to the public. All texts included in this review are accessible via open access or journal subscription.

Declaration of interests

The funders had no role in this systematic review.

AW has no interests to declare. JL-R reports funding from the Health Research Council of New Zealand not related to this project. SH reports funding through a Pacific Fellowship from The Heart Foundation of New Zealand and Pūtahi Manawa, Healthy Hearts for Aotearoa New Zealand Centre of Research Excellence (CoRE). She is also a member of the Consumer, Whānau and Clinician Digital Council Health New Zealand National Cardiac Clinical Network Health New Zealand. RE-L has no interests to declare. KMB is Co-Director of Pūtahi Manawa, Healthy Hearts for Aotearoa New Zealand Centre of Research Excellence (CoRE) and reports funding from the Health Research Council of New Zealand not related to this project. KMB received travel support from the Cardiac Society of Australia and New Zealand to attend the CSANZ conference in 2022. JP's employer has received financial contributions from GSK, Novavax and CSL Seqirus for research, advisory board membership and a presentation by JP. JW-S has no interests to declare. VS reports funding from the Healthier Lives—He Oranga Hauora—National Science Challenge, the Heart Foundation of New Zealand and the Health Research Council of New Zealand (programme and project grants). VS is a Cess@Tion EQUIT3 DSMB member and an Auckland Medical Research Foundation Board Member and Deputy Chair, Medical Assessing Committee. SA reports funding from the Manawataki Fatu Fatu Programme grant funded by the Healthier Lives—He Oranga Hauora—National Science Challenge, the Heart Foundation of New Zealand and the Health Research Council of New Zealand. SA also reports funding for injury/trauma research (unrelated to the content of this paper) by the Health Research Council of New Zealand Health Delivery Career Development Award that she received. CG reports funding from the Healthier Lives—He Oranga Hauora—National Science Challenge, the Heart Foundation of New Zealand and the Health Research Council of New Zealand. MH reports funding from the Healthier Lives—He Oranga Hauora—National Science Challenge, the Heart Foundation of New Zealand and the Health Research Council of New Zealand.

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Appendix A. Supplementary data

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