

# A systematic review on assessment and management of preventive cardiovascular care in primary health for Aboriginal and Torres Strait Islander women and men

Katharine McBride<sup>A,B,\*</sup> , Jayden Nguyen<sup>B</sup>, Anna Dowling<sup>C,D</sup>, Natasha J. Howard<sup>B,E</sup>, Christine Franks<sup>B,D</sup>, Susan Hillier<sup>A</sup>, Vicki Wade<sup>D,F</sup>, Veronica King<sup>D,G</sup>, Janice Rigney<sup>D</sup>, Nyunmiti Burton<sup>D,H</sup>, Julie Anne Mitchell<sup>D,I</sup>, Stephen J. Nicholls<sup>J</sup>, Catherine Paquet<sup>A,K,#</sup> and Alex Brown<sup>B,E,#</sup>

For full list of author affiliations and declarations see end of paper

## \*Correspondence to:

Katharine McBride  
Allied Health & Human Performance,  
University of South Australia, Adelaide, SA  
5000, Australia  
Email:  
[Katharine.McBride@mymail.unisa.edu.au](mailto:Katharine.McBride@mymail.unisa.edu.au)

#Joint senior authors.

Received: 4 November 2021

Accepted: 23 December 2021

Published: 8 April 2022

## Cite this:

McBride K *et al.* (2022)  
*Australian Journal of Primary Health*  
28(3), 179–199. doi:10.1071/PY21219

© 2022 The Author(s) (or their employer(s)). Published by CSIRO Publishing on behalf of La Trobe University.

This is an open access article distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License ([CC BY-NC-ND](https://creativecommons.org/licenses/by-nc-nd/4.0/))

OPEN ACCESS

## ABSTRACT

In promoting positive cardiovascular health for Aboriginal and Torres Strait Islander peoples, there is a need to ensure provision of high-quality risk assessment and management in primary healthcare settings. There is some evidence of gender gaps for Australian women in the provision of cardiovascular risk assessment and management; however, there is little understanding of whether these gaps are also present for Aboriginal and Torres Strait Islander women. A mixed-method systematic review was utilised to synthesise existing evidence on the provision of assessment and management against guideline-recommended care for Aboriginal and Torres Strait Islander women, and determine whether gender disparities in provision of care exist for this population. Sixteen studies that report gender-specific data indicate there are significant gaps in the provision of assessment and management for Aboriginal and Torres Strait Islander women and men alike. There is no evidence of incorporation of social and emotional wellbeing into cardiovascular care and limited studies outlining the assessment and management of behaviours and factors that may be protective of cardiovascular health. Furthermore, little is known about the provision of care in mainstream primary health services for Aboriginal and Torres Strait Islander peoples.

**Keywords:** Aboriginal and Torres Strait Islander peoples, Australia, cardiovascular disease prevention and control, health equity, Indigenous peoples, primary health care, systematic review, women.

## Introduction

Preventive primary health care (PHC) is essential to tackle the burden of cardiovascular disease in Australia ([The Royal Australian College of General Practitioners 2018](#)). Well-established guidelines exist for the assessment and management of risk for those without existing disease, with significant efforts invested to translate these guidelines into clinical practice ([National Vascular Disease Prevention Alliance 2012](#); [The Royal Australian College of General Practitioners 2018](#)). Despite this, it is likely significant gaps remain in evidence-based primary health care for specific sub-populations, such as those defined by ethnicity, gender, socioeconomic status and geography ([Peiris \*et al.\* 2009](#); [Banks \*et al.\* 2020](#)).

To identify and address gaps, the challenge exists to understand which population groups are less likely to receive guideline-recommended care. Risk assessment and management have been prioritised, recognising burden for the Aboriginal and Torres Strait Islander population, opportunity to reduce lifetime risk through disease prevention and disparities in provision of evidence-based care ([Better Cardiac Care Forum 2014](#); [Australian Institute of Health and Welfare 2019b](#); [Bailie \*et al.\* 2019](#)). However, uptake of

guideline-recommended care has been identified as sub-optimal, further hampered by inconsistency in evidence-based guidelines (Australian Institute of Health and Welfare 2019b; Agostino *et al.* 2020; Paige *et al.* 2020). In regard to women, some evidence suggests gender is associated with differentials in care. Hyun *et al.* (2017) found fewer women receive absolute cardiovascular risk (ACVR) assessment, and fewer younger women receive guideline-recommended therapies. The intersectionality of racism and sexism is identified as a driver of health inequities for Aboriginal and Torres Strait Islander women (McBride *et al.* 2021). Among the Aboriginal and Torres Strait Islander population, gender differences exist in cardiovascular health; 59% of women report prevalent disease compared to 41% of men (Australian Institute of Health and Welfare 2015c). Given the evidence of inequities for Australian women, we sought to explore whether there were gender differentials in receipt of evidence-based care among the Aboriginal and Torres Strait Islander population.

This paper describes a systematic literature review examining the published evidence on the provision of cardiovascular risk assessment and management for Aboriginal and Torres Strait Islander women, and the existence of gender differentials in receipt of guideline-recommended care.

## Methods

A mixed-method comprehensive systematic review was applied to synthesise knowledge from qualitative and quantitative research (Aromataris and Munn 2020). The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement guidelines were followed (Moher *et al.* 2009). An Aboriginal Women's Advisory Group oversaw the conduct of the review to ensure appropriate interpretation and presentation of results.

The population of interest was Aboriginal and Torres Strait Islander women in Australia. The phenomena of interest were: receipt of a Medicare Benefits Schedule (MBS) Health Assessment, assessment of ACVR and/or assessment and management of individual cardiovascular risk factors. The review considered studies where assessment and management occurred in primary health services; exclusion occurred where care was not undertaken within the service or care was provided at an outreach program. Comparison to Aboriginal and Torres Strait Islander men was included. Quantitative, qualitative and expert opinion peer-reviewed and grey literature published in the period 1 January 2010–30 June 2020 in English were considered for inclusion, providing a 10-year observation window.

PubMed, Emcare, Embase, Scopus, PsychInfo, ProQuest, ATSIHealth via Informit Online, Web of Science and Australian Indigenous Health Bulletin were searched in August 2020. Reference lists of included studies were

subsequently searched. A search algorithm was developed based on keywords and reviewed by a librarian (Box 1, Supplementary Table S2). Screening, review and assessment were undertaken using Covidence (Veritas Health Innovation). Two reviewers (KM, AD) screened the title and abstract, a third (NH) adjudicated. One reviewer (KM) completed a full-text review, a second reviewer (JN) undertook a 20% audit, a third (NH) adjudicated. Authors of full-text studies without gender-specific results were contacted for any gender-specific analysis. Included full-texts were independently assessed by two reviewers (KM, JN) for methodological validity using the Joanna Briggs Institute (JBI) design-specific tools (Aromataris and Munn 2020) and the Aboriginal and Torres Strait Islander Quality Appraisal Tool (Harfield *et al.* 2020).

### Box 1. Keywords forming the search algorithm.

- Indigenous; Aboriginal; Torres Strait Islander;
- Australia;
- women; female;
- cardiovascular; heart; stroke; cardiac; cerebrovascular;
- risk; protective; assess; manage; prevent;
- primary health; primary care.

Extraction was undertaken by one reviewer (KM) and reviewed by a second (JN) using adapted JBI extraction tools in Microsoft Excel (Microsoft Corporation; Aromataris and Munn 2020). Measures of risk assessment and management were based on comprehensive risk assessment guidelines for management of absolute cardiovascular disease risk (National Vascular Disease Prevention Alliance 2012). MBS health assessment was reported as a nationally recognised comprehensive assessment that includes cardiovascular risk factors and an indicator for funding (Australian Institute of Health and Welfare 2019a; Finlay 2019). Where studies were part of a series, all were included and cross-referenced. WebPlotDigitizer (version 4.4; A. Rohatgi, <https://automeris.io/WebPlotDigitizer>) was used to extract data where only graphs were available. Findings are reported in a narrative summary given the heterogeneity in information sources and measurement for each phenomenon of interest.

## Results

Sixteen studies reported assessment and management of cardiovascular risk for Aboriginal and Torres Strait Islander women in PHC services (Fig. 1). Studies were assessed for methodological and Aboriginal and Torres Strait Islander cultural and contextual relevance and validity; none were excluded on quality (Supplementary Appendix S1, Table S1a–d). Table 1 provides an overview

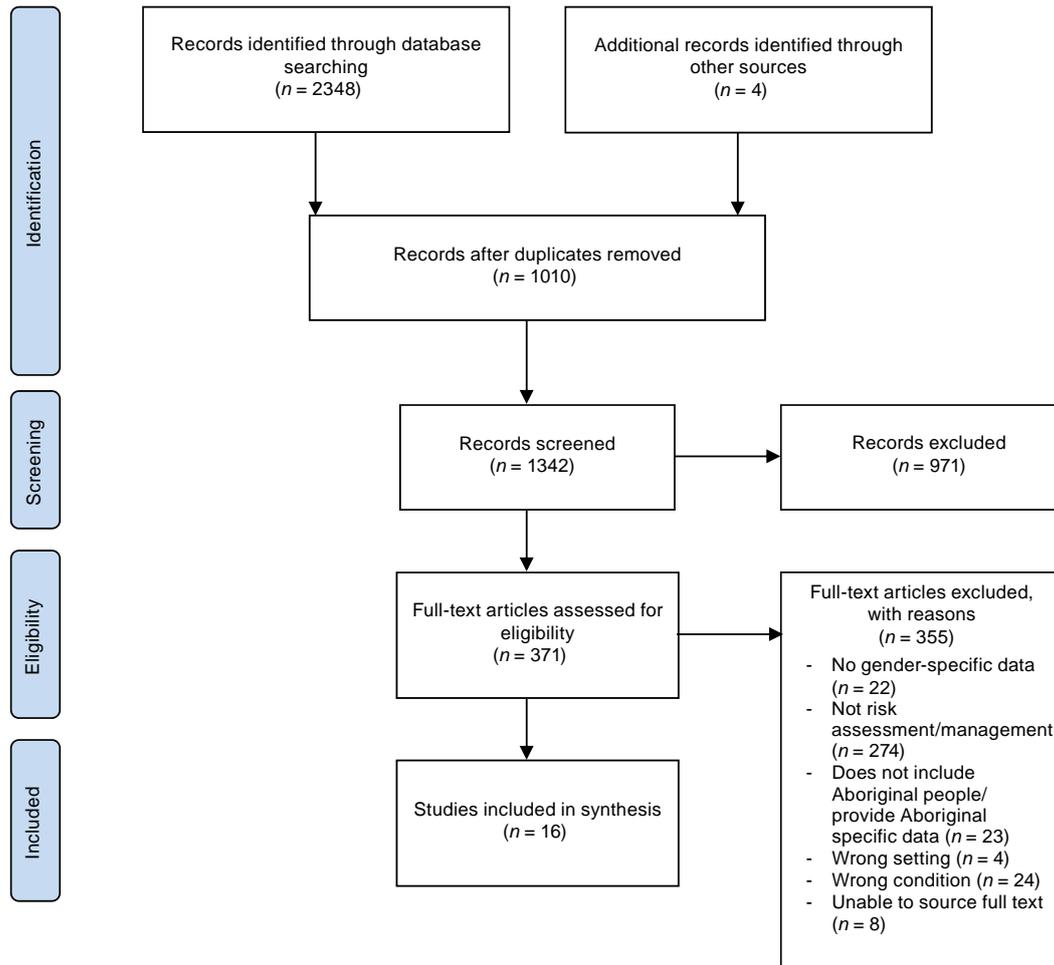


Fig. 1. PRISMA diagram.

of included studies. Table 2 details the assessment and management results by each study.

### Medicare Benefits Schedule (MBS) and Aboriginal and Torres Strait Islander health assessment

Nine studies reported the proportion of Aboriginal and Torres Strait Islander peoples to have received an MBS health assessment.

Age-specific and age-standardised estimated proportion of population to receive an assessment within the past 12 months was reported in four studies. After age standardisation, a greater proportion of Aboriginal and Torres Strait Islander women received an MBS health assessment compared to men (36% vs 31% in 2018). From 2004–05 to 2017–18, there was approximately a 30% increase in the proportion of women and men receiving assessments (Australian Institute of Health and Welfare 2019a).

Six studies reported the age-specific proportion of clients to receive an MBS health assessment within the preceding

2 years in services funded primarily for Aboriginal and Torres Strait Islander peoples. Proportions were similar by gender, and higher in older age groups. By 2018, the proportion was between 45% and 59% across all age groups.

### Absolute cardiovascular risk assessment (ACVR)

Five studies reported ACVR assessment for Aboriginal and Torres Strait Islander peoples by gender.

Three studies reported the age-specific proportion of clients with information available to calculate an ACVR score in the preceding 2 years for people aged 35–74 years; there was little difference in the proportion of women and men (Australian Institute of Health and Welfare 2019b).

Two studies reported the odds ratio of Aboriginal and Torres Strait Islander women with information to calculate (or recorded) ACVR within the preceding 2 years. Matthews *et al.* (2017) reported women aged  $\geq 20$  years were less likely than men to have ACVR recorded, but not at a level of

**Table 1.** Details of studies included in systematic literature review.

Study reference (1st author, year, title)	Data source (name, year)	Geography	Population	Sample size	Risk assessment	Management of cardiovascular risk
Crinall et al. (2017)  Cardiovascular disease risk in young Indigenous Australians: a snapshot of current preventive health care	ABCD, 2010–12	Qld, NT, SA, NSW, WA	78 Government PHC Services and 15 ACCHS	Women: 1002	MBS health assessment	Blood glucose management plan
				Men: 984	Blood glucose Blood pressure BMI Cholesterol Smoking	Blood pressure management plan Cholesterol management plan Smoking cessation support Weight management
Hoy et al. (2014)  Evidence for improved patient management through electronic patient records at a central Australian Aboriginal health service	CAAC PMS, 2007–09	Alice Springs, NT	1 ACCHS	Women: 263	UACR	–
				Men: 205	Alcohol Blood glucose Blood pressure BMI Cholesterol eGFR HbA1c Proteinuria Smoking Waist circumference Weight	
Panaretto et al. (2013)  Prevention and management of chronic disease in Aboriginal and Islander community controlled health services in Queensland: a quality improvement study assessing change in selected	QAIHC Core Indicator report, 2010–12	Qld	18 Aboriginal and Islander Community Controlled Health Services	19 727	Waist circumference	–

(Continued on next page)

Table 1. (Continued)

Study reference (1st author, year, title)	Data source (name, year)	Geography	Population	Sample size	Risk assessment	Management of cardiovascular risk
clinical performance indicators over time in a cohort of services						
<a href="#">Stewart et al. (2012)</a> The risk status, screening history and health concerns of Aboriginal and Torres Strait Islander people attending an Aboriginal community controlled health service	Derbarl Yerrigan Health Service, 2007–09	Perth, WA	1 ACCHS	Women: 385 Men: 202	Blood glucose Blood pressure Cholesterol	–
<a href="#">Australian Institute of Health and Welfare (2019b)</a> National key performance indicators for Aboriginal and Torres Strait Islander primary health care: results to June 2018	nKPIs, 2018	National	233 PHC organisations that receive funding from the Department of Health to provide services primarily to Aboriginal and Torres Strait Islander peoples	Women: 132 092 Men: 99 013	MBS health assessment ACVR assessment Alcohol eGFR Smoking	–
<a href="#">Australian Institute of Health and Welfare (2018b)</a> National key performance indicators for Aboriginal and Torres Strait Islander primary health care: results for 2017	nKPIs, 2017	National	231 PHC organisations that receive funding from the Department of Health to provide services primarily to Aboriginal and Torres Strait Islander peoples	362 000	MBS health assessment ACVR assessment Alcohol eGFR Smoking	–
<a href="#">Australian Institute of Health and Welfare (2017)</a> National key performance indicators for Aboriginal and Torres Strait Islander primary health care: results from June 2016	nKPIs, 2016	National	241 PHC organisations that receive funding from the Department of Health to provide services primarily to Aboriginal and Torres Strait Islander peoples	Women: 114 733 Men: 86 916	MBS health assessment ACVR assessment Alcohol eGFR Smoking	–

(Continued on next page)

Table 1. (Continued)

Study reference (1st author, year, title)	Data source (name, year)	Geography	Population	Sample size	Risk assessment	Management of cardiovascular risk
Australian Institute of Health and Welfare (2015d) National key performance indicators for Aboriginal and Torres Strait Islander primary health care: results from December 2014	nKPIs, 2014	National	233 PHC organisations that receive funding from the Australian Government Department of Health to provide services primarily to Aboriginal and Torres Strait Islander peoples	289 827	MBS health assessment Alcohol eGFR Smoking	–
Australian Institute of Health and Welfare (2014) National key performance indicators for Aboriginal and Torres Strait Islander primary health care: results from December 2013	nKPIs, 2013	National	207 PHC organisations that receive funding from the Department of Health to provide services primarily to Aboriginal and Torres Strait Islander peoples	265 045	MBS health assessment Alcohol eGFR Smoking	–
Australian Institute of Health and Welfare (2019a) Better cardiac care measures for Aboriginal and Torres Strait Islander people: fourth national report 2018–2019	nKPIs, 2018 MBS, 2004–18	National	Service utilisation database 233 PHC organisations that receive funding from the Department of Health to provide services primarily to Aboriginal and Torres Strait Islander peoples	N/A	ACVR assessment MBS health assessment	–
Australian Institute of Health and Welfare (2018a) Better cardiac care measures for Aboriginal and Torres Strait Islander people: third national report	MBS, 2015–16	National	Service utilisation database	N/A	MBS health assessment	–
Australian Institute of Health and Welfare (2016) Better cardiac care measures for Aboriginal and Torres Strait Islander people: second national report 2016	MBS, 2014–15	National	Service utilisation database	N/A	MBS health assessment	–
Australian Institute of Health and Welfare (2015b) Better cardiac care measures for Aboriginal and Torres Strait Islander people: first national report 2015	MBS, 2013–14 AATSIHS, 2012–13	National	Service utilisation database Population survey	N/A Women: 207 914 Men: 201 027	MBS health assessment Blood pressure	Smoking cessation advice

(Continued on next page)

Table 1. (Continued)

Study reference (1st author, year, title)	Data source (name, year)	Geography	Population	Sample size	Risk assessment	Management of cardiovascular risk
Australian Institute of Health and Welfare (2015a) Aboriginal and Torres Strait Islander health performance framework 2014 report: detailed analyses	AATSIHS, 2012–13	National	Population survey	Women: 207 914 Men: 201 027	–	Nutrition advice Alcohol consumption advice Physical activity advice Smoking cessation advice Weight management advice
Hyun <i>et al.</i> (2017) Gender inequalities in cardiovascular risk factor assessment and management in primary health care	TORPEDO Study; 2011–12	NSW and Qld	40 GPs and 20 ACCHSs	Women: 5411 Men: 4012 Non-Indigenous women: 25 190 Non-Indigenous men: 18 472	ACVR assessment	Blood pressure and cholesterol medication
Matthews <i>et al.</i> (2017) Integrated clinical decision support systems promote absolute cardiovascular risk assessment: an important primary prevention measure in Aboriginal and Torres Strait Islander primary health care	ABCD, 2012–14	NT	48 PHC services	Women: 711 Men: 677	ACVR assessment	

AATSIHS, Australian Aboriginal and Torres Strait Islander Health Survey; ABCD, Audit for Best practice in Chronic Disease; ACCHS, Aboriginal Community Controlled Health Service; ACVR, absolute cardiovascular risk; BMI, body mass index; CAAC, Central Australian Aboriginal Congress; eGFR, estimated glomerular filtration rate; HbA1c, haemoglobin A1c; MBS, Medicare Benefits Schedule; N/A, not applicable; nKPIs, National Key Performance Indicators for Aboriginal and Torres Strait Islander primary health care; NSW, New South Wales; NT, Northern Territory; PHC, primary health care; PMS, patient management system; Qld, Queensland; QAIHC, Queensland Aboriginal and Islander Health Council; SA, South Australia; UACR, urinary albumin:creatinine ratio; WA, Western Australia.

**Table 2.** Summary of systematic literature review findings, by measure of cardiovascular risk assessment and management.

Measure	# of studies	Study	Year	Age (years)	Aboriginal and Torres Strait Islander women	Aboriginal and Torres Strait Islander men	Statistical significance
<b>Medicare Benefits Schedule (MBS) Aboriginal and Torres Strait Islander health assessment</b>	<b>9</b>						
Estimated proportion of population in past 12 months (715 only)	4	Australian Institute of Health and Welfare (2015b)	2013–14	25–34	23%	16%	n/a
				35–44	26%	21%	
				45–54	31%	26%	
				55–64	34%	29%	
				≥65	40%	35%	
		Australian Institute of Health and Welfare (2016)	2014–15	15–24	22%	15%	n/a
				25–34	24%	17%	
				35–44	28%	22%	
				45–54	30%	27%	
				55–64	35%	30%	
		Australian Institute of Health and Welfare (2018a)	2015–16	15–24	24%	17%	n/a
				25–34	27%	19%	
				35–44	30%	25%	
				45–54	34%	29%	
55–64	38%			33%			
Australian Institute of Health and Welfare (2019a)	2004–05 to 2017–18 age standardised	15–24	28%	20%	n/a		
		25–34	31%	21%			
	2017–18 age-specific (age-specific presented)	25–34	31%	21%			
		35–44	36%	29%			

(Continued on next page)

Table 2. (Continued)

Measure	# of studies	Study	Year	Age (years)	Aboriginal and Torres Strait Islander women	Aboriginal and Torres Strait Islander men	Statistical significance
				45–54	41%	35%	
				55–64	44%	39%	
				≥65	51%	44%	
Proportion of PHC clients receiving assessment in past 2 years	6	Crinall <i>et al.</i> (2017)	2010–12	15–34	28%	33%	n/a
		Australian Institute of Health and Welfare (2014)	2013	25–34	33%	35%	n/a
				35–44	38%	39%	
				45–54	42%	43%	
				55–64	46%	47%	
				≥65	46%	44%	
				25–34	38%	40%	n/a
		Australian Institute of Health and Welfare (2015d)	2014	35–44	43%	43%	
				45–54	46%	47%	
				55–64	49%	51%	
				≥65	49%	48%	
				25–34	42%	44%	n/a
				35–44	47%	47%	
		Australian Institute of Health and Welfare (2017)	2016	45–54	50%	51%	
				55–64	53%	54%	
				≥65	54%	53%	
				25–34	45%	47%	n/a
				35–44	49%	50%	
45–54	52%			54%			
Australian Institute of Health and Welfare (2018b)	2017	55–64	56%	57%			
		≥65	55%	55%			
		25–34	46%	48%	n/a		
		35–44	50%	51%			
		45–54	52%	54%			
		55–64	56%	57%			
Australian Institute of Health and Welfare (2019b)	2017–18 (2018 presented)	25–34	46%	48%	n/a		
		35–44	50%	51%			

(Continued on next page)

Table 2. (Continued)

Measure	# of studies	Study	Year	Age (years)	Aboriginal and Torres Strait Islander women	Aboriginal and Torres Strait Islander men	Statistical significance
				45–54	54%	55%	
				55–64	57%	58%	
				≥65	57%	58%	
<b>Absolute cardiovascular risk assessment</b>	<b>5</b>						
Recorded in past 2 years	1	Matthews et al. (2017)	2014	≥20	OR women (vs men): 0.80 (95% CI: 0.60–1.07)		P = 0.13
Information to record in past 2 years	4	Hyun et al. (2017)	2011	≥35	OR women (vs men): 0.81 (95% CI: 0.66–1.00)		n/a
				35–54	OR women (vs men): 0.75 (95% CI: 0.63–0.89)		
				55–64	OR women (vs men): 0.72 (95% CI: 0.51–1.02)		
				≥65	OR women (vs men): 1.05 (95% CI: 0.64–1.72)		
		Australian Institute of Health and Welfare (2017)	2016	35–44	34%	34%	n/a
				45–54	42%	41%	
				55–64	46%	47%	
				65–74	47%	46%	
		Australian Institute of Health and Welfare (2018b)	2017	35–44	40%	41%	n/a
				45–54	49%	50%	
				55–64	53%	54%	
				65–74	53%	52%	
		Australian Institute of Health and Welfare (2019b)	2017–18 (2018 presented)	35–44	42%	42%	n/a

(Continued on next page)

Table 2. (Continued)

Measure	# of studies	Study	Year	Age (years)	Aboriginal and Torres Strait Islander women	Aboriginal and Torres Strait Islander men	Statistical significance
				45–54	51%	52%	
				55–64	55%	57%	
				65–74	55%	55%	
<b>Assessment of individual cardiovascular risk factors and comorbidity biomarkers</b>							
Smoking	7						
Recorded within past 2 years		Crinall <i>et al.</i> (2017)	2010–12	15–34	55%	50%	$P = 0.03$
		Hoy <i>et al.</i> (2014)	2009, 2011	≥15	2009: 58.6% 2011: 65.8%	2009: 51.7% 2011: 59.10%	n/a
		Australian Institute of Health and Welfare (2014)	2013	15–24	68%	60%	n/a
				25–34	76%	70%	
				35–44	77%	75%	
				45–54	79%	79%	
				55–64	81%	81%	
				≥65	80%	79%	
				15–24	74%	66%	
25–34	80%	75%					
35–44	81%	79%					
45–54	83%	83%					
55–64	84%	84%					
≥65	83%	83%					
15–24	74%	69%	n/a				
25–34	80%	75%					
35–44	80%	78%					
45–54	81%	81%					

(Continued on next page)

Table 2. (Continued)

Measure	# of studies	Study	Year	Age (years)	Aboriginal and Torres Strait Islander women	Aboriginal and Torres Strait Islander men	Statistical significance
				55–64	82%	83%	
				≥65	82%	81%	
		Australian Institute of Health and Welfare (2018b)	2017	15–24	77%	72%	n/a
				25–34	83%	79%	
				35–44	83%	82%	
				45–54	85%	85%	
				55–64	86%	87%	
				≥65	85%	86%	
		Australian Institute of Health and Welfare (2019b)	2017–18(2018 presented)	15–24	79%	74%	n/a
				25–34	84%	80%	
				35–44	84%	83%	
				45–54	85%	86%	
				55–64	87%	88%	
				≥65	87%	87%	
Blood pressure	4						
Recorded in past 2 years	2	Crinall et al. 2017	2010–12	15–34	88%	82%	$P < 0.001$
		Hoy et al. (2014)	2009, 2011	≥15	2009: 58% 2011: 82%	2009: 54% 2011: 73%	n/a
Recorded in past 2 years if considered high risk (self-reported: type-2 diabetes, hypertensive disease, high blood pressure, high cholesterol, current smoker)	1	Australian Institute of Health and Welfare (2015b)	2012–13	18–24	83%	76%	n/a
				25–34	84%	78%	
				35–44	86%	91%	
				45–54	93%	89%	
				≥55	99%	97%	
Recorded in past 12 months, or 6 months if with diabetes	1	Stewart et al. (2012)	2007–09	≥18	62%	56%	$P = 0.1594$

(Continued on next page)

Table 2. (Continued)

Measure	# of studies	Study	Year	Age (years)	Aboriginal and Torres Strait Islander women	Aboriginal and Torres Strait Islander men	Statistical significance
<i>Cholesterol</i>							
Recorded in past 2 years	3	Crinall <i>et al.</i> (2017)	2010–12	15–34	31%	32%	$P = 0.37$
		Hoy <i>et al.</i> (2014)	2009, 2011 (2011 presented)	≥15	Triglyceride: 59% HDL: 56% LDL: 57%	Triglyceride: 53% HDL: 53% LDL: 49%	n/a
		Stewart <i>et al.</i> (2012)	2007–09	≥18	73%	72%	$P = 0.7107$
<i>Weight</i>							
Recorded in past 2 years	1	Hoy <i>et al.</i> (2014)	2009, 2011	≥15	2009: 58% 2011: 79%	2009: 52% 2011: 69%	n/a
<i>Waist circumference</i>							
Recorded in past 2 years	2	Hoy <i>et al.</i> (2014)	2009, 2011	≥15	2009: 31% 2011: 58%	2009: 21% 2011: 42%	n/a
Recorded in past 6 months	1	Panaretto <i>et al.</i> (2013)	2009–2012	≥15	'Conversely, waist circumference is recorded in one in six women only, despite the data showing one in two women having a BMI of over 30 and recording of renal function was low' (Page 7)		n/a
<i>BMI</i>							
Recorded in past 2 years	2	Crinall <i>et al.</i> (2017)	2010–12	15–34	36%	39%	$P = 0.23$
		Hoy <i>et al.</i> (2014)	2009, 2011	≥15	2009: 53% 2011: 45%	2009: 74% 2011: 63%	n/a
<i>Nutrition</i>							
	0						
<i>Physical activity</i>							
	0						

(Continued on next page)

Table 2. (Continued)

Measure	# of studies	Study	Year	Age (years)	Aboriginal and Torres Strait Islander women	Aboriginal and Torres Strait Islander men	Statistical significance
Alcohol consumption	6						
Recorded in past 2 years		Hoy et al. (2014)	2009, 2011	≥15	2009: 58%	2009: 67%	n/a
					2011: 52%	2011: 60%	
		Australian Institute of Health and Welfare (2014)	2013	15–24	47%	42%	n/a
				25–34	51%	48%	
				35–44	53%	53%	
				45–54	54%	56%	
				55–64	56%	57%	
				≥65	52%	53%	
		Australian Institute of Health and Welfare (2015d)	2014	15–24	52%	47%	n/a
				25–34	55%	52%	
				35–44	56%	56%	
				45–54	58%	59%	
				55–64	58%	61%	
				≥65	55%	56%	
		Australian Institute of Health and Welfare (2017)	2016	15–24	55%	51%	n/a
				25–34	57%	55%	
				35–44	58%	58%	
				45–54	60%	61%	
	55–64			62%	64%		
	≥65			60%	61%		
	Australian Institute of Health and Welfare (2018b)	2017	15–24	60%	55%	n/a	
			25–34	63%	60%		
			35–44	64%	64%		
			45–54	66%	67%		
			55–64	67%	69%		

(Continued on next page)

Table 2. (Continued)

Measure	# of studies	Study	Year	Age (years)	Aboriginal and Torres Strait Islander women	Aboriginal and Torres Strait Islander men	Statistical significance
				≥65	64%	66%	
		Australian Institute of Health and Welfare (2019b)	2017–18 (2018 presented)	15–24	62%	58%	n/a
				25–34	65%	62%	
				35–44	65%	66%	
				45–54	67%	69%	
				55–64	69%	71%	
				≥65	67%	69%	
Social and emotional wellbeing	0						
Biomarkers of diabetes – HbA1c	1						
Recorded in past 2 years		Hoy et al. (2014)	2009, 2011	≥15	2009: 37% 2011: 65%	2009: 23% 2011: 51%	n/a
Biomarkers of diabetes – blood glucose	3						
Recorded in past 2 years	2	Crinall et al. (2017)	2010–12	15–34	68%	58%	P ≤0.001
		Hoy et al. (2014)	2009, 2011	≥15	2009: 55% 2011: 77%	2009: 48% 2011: 66%	n/a
Recorded in past 12 months	1	Stewart et al. (2012)	2007–09	≥35	73%	80%	P = 0.1777
Biomarkers of chronic kidney disease – eGFR	1						
Recorded in past 2 years		Hoy et al. (2014)	2009, 2011	≥15	2009: 44% 2011: 60%	2009: 48% 2011: 57%	n/a
Biomarkers of chronic kidney disease – proteinuria	1						
Recorded in past 2 years		Hoy et al. (2014)	2009, 2011	≥15	2009: 53% 2011: 66%	2009: 22% 2011: 39%	n/a
Biomarkers of chronic kidney disease – urinary albumin:creatinine ratio	1						
Recorded in past 2 years		Hoy et al. (2014)	2009, 2011	≥15	2009: 43%	2009: 36%	n/a

(Continued on next page)

Table 2. (Continued)

Measure	# of studies	Study	Year	Age (years)	Aboriginal and Torres Strait Islander women	Aboriginal and Torres Strait Islander men	Statistical significance
					2011: 60%	2011: 54%	
<b>Management of individual cardiovascular risk factors</b>							
<i>Smoking cessation</i>	3						
Discussed reducing or quitting smoking with GP in past 12 months, regardless of smoking status	1	Australian Health Ministers' Advisory Council (2015)	2012–13	≥15	40%	47%	P = 0.05
Discussed quitting smoking in past 12 months if current smoker and considered high risk if self-reported: type-2 diabetes, hypertensive disease, high blood pressure, high cholesterol, current smoker	1	Australian Institute of Health and Welfare (2015b)	2012–13	18–24	38%	27%	n/a
				25–34	39%	32%	
				35–44	42%	44%	
				45–54	52%	49%	
				≥55	42%	46%	
Brief intervention in past 2 years, current smokers only	1	Crinall et al. (2017)	2010–12	15–34	62%	68%	P = 0.17
<i>Blood pressure</i>	2						
Management plan in past 2 years	1	Crinall et al. (2017)	2010–12	15–34	32%	27%	P = 0.59
Medication prescription in past 2 years With high absolute cardiovascular risk, blood pressure-lowering medication and statin; with established disease, blood pressure lowering medication, statin and antiplatelet	1	Hyun et al. (2017)	2011	≥35	OR women (vs men): 1.10 (95% CI: 0.94–1.30)		n/a
				35–54	OR women (vs men): 0.65 (95% CI: 0.53–0.80)		
				55–64	OR women (vs men): 1.30 (95% CI: 1.00–1.69)		
				≥65	OR women (vs men): 1.23 (95% CI: 0.93–1.62)		
<i>Cholesterol</i>	2						
Management plan in past 2 years	1	Crinall et al. (2017)	2010–12	15–34	14%	18%	P = 0.27
Medication prescription in past 2 years	1	Hyun et al. (2017)	2011	≥35	OR women (vs men): 1.10 (95% CI: 0.94–1.30)		n/a

(Continued on next page)

Table 2. (Continued)

Measure	# of studies	Study	Year	Age (years)	Aboriginal and Torres Strait Islander women	Aboriginal and Torres Strait Islander men	Statistical significance
				35–54	OR women (vs men): 0.65 (95% CI: 0.53–0.80)		
				55–64	OR women (vs men): 1.30 (95% CI: 1.00–1.69)		
				≥65	OR women (vs men): 1.23 (95% CI: 0.93–1.62)		
<i>Weight management</i>	2						
Discussed with GP in past 12 months, regardless of weight	1	Australian Health Ministers' Advisory Council (2015)	2012–13	≥15	50%	49%	$P > 0.05$
Brief intervention in past 2 years if overweight/obese	1	Crinall <i>et al.</i> (2017)	2010–12	15–34	42%	41%	$P = 0.89$
Referral in past 2 years if overweight/obese	1	Crinall <i>et al.</i> (2017)	2010–12	15–34	13%	8%	$P = 0.11$
<i>Nutrition</i>	1						
Discussed eating healthy food or improving their diet with GP in past 12 months, regardless of weight/nutrition		Australian Health Ministers' Advisory Council (2015)	2012–13	≥15	43%	46%	$P > 0.05$
<i>Physical activity</i>	1						
Discussed increasing physical activity with GP in past 12 months, regardless of physical activity levels		Australian Health Ministers' Advisory Council (2015)	2012–13	≥15	28%	33%	$P > 0.05$
<i>Alcohol intake</i>	1						
Discussed drinking in moderation with GP in past 12 months, regardless of physical activity levels		Australian Health Ministers' Advisory Council (2015)	2012–13	≥15	8%	26%	$P < 0.05$
<i>Diabetes management</i>	1						
Plan in past 2 years if blood glucose elevated		Crinall <i>et al.</i> (2017)	2010–12	15–34	15%	18%	$P = 0.43$

BMI, body mass index; CI, confidence interval; eGFR, estimated glomerular filtration rate; HbA1c, haemoglobin A1c; HDL, high-density lipoprotein; LDL, low-density lipoprotein; MBS, Medicare Benefits Schedule; n/a, not applicable; OR, odds ratio; PHC, primary health care.

statistical significance. [Hyun \*et al.\* \(2017\)](#) reported Aboriginal and Torres Strait Islander women aged  $\geq 35$  years were less likely to have information recorded; this difference was not statistically significant. When analysed by age group, Aboriginal and Torres Strait Islander women aged 35–54 years were significantly less likely to have information recorded to calculate ACVR compared to men of the same age ([Hyun \*et al.\* 2017](#)).

## Assessment and management of individual cardiovascular risk factors and comorbidity biomarkers

### Smoking

Seven studies reported recording of smoking status in the preceding 2 years, predominantly from Aboriginal Community Controlled Health Organisations (ACCHOs) and Government PHC services. Across most studies and ages, women had a slightly higher proportion compared to men. In 2018, approximately three quarters were having assessments recorded.

Three studies reported smoking interventions. In the Australian Aboriginal and Torres Strait Islander Health Survey 2012–2013 (AATSIHS), 40% of women and 47% of men self-reported discussing quitting or reducing smoking status with their doctor in the previous 12 months, regardless of smoking status ([Australian Health Ministers' Advisory Council 2015](#)). Data from the same survey were reported for current smokers, with similar proportions by gender across age groups ([Australian Institute of Health and Welfare 2015b](#)). [Crinall \*et al.\* \(2017\)](#) reported 62% of women aged 15–34 who were current smokers had received a brief intervention in the previous 2 years.

### Blood pressure

Recording of blood pressure was reported in four studies. [Crinall \*et al.\* \(2017\)](#) found women aged 15–34 years were significantly more likely to have blood pressure recorded compared to men. [Hoy \*et al.\* \(2014\)](#) and [Stewart \*et al.\* \(2012\)](#) found similar patterns in adults of all ages. The AATSIHS found over three quarters of those at high risk, but without cardiovascular disease, received blood pressure assessment in the previous 2 years; this was similar between genders ([Australian Institute of Health and Welfare 2015b](#)).

Two studies reported blood pressure management. Of those aged 15–34 years with hypertension ( $\geq 140/90$  mmHg), 32% of women and 27% of men had a management plan recorded ([Crinall \*et al.\* 2017](#)). [Hyun \*et al.\* \(2017\)](#) reported prescription of blood pressure and/or cholesterol medications for clients aged  $\geq 35$  years. There was no statistically significant variation between genders. Women aged 35–54 years were less likely to receive prescriptions (OR: 0.65; 95% CI: 0.53–0.80) compared to men.

### Cholesterol

Three studies reported recording of cholesterol status in the preceding 2 years. [Crinall \*et al.\* \(2017\)](#) and [Stewart \*et al.\* \(2012\)](#) also found little variance by gender. [Hoy \*et al.\* \(2014\)](#) reported triglyceride, high-density lipids and low-density lipids, with the greatest proportion of clients having triglyceride recorded (women: 59% vs men: 53%).

Two studies reported management of cholesterol. [Crinall \*et al.\* \(2017\)](#) reported recording of a cholesterol management plan for clients aged 15–34 years who had not met blood lipid targets; approximately 15% of women and men had a plan recorded.

### Weight, waist circumference and body mass index (BMI)

Weight was reported in one study, waist circumference and BMI each recorded in two studies. [Hoy \*et al.\* \(2014\)](#) reported recording of weight, waist circumference and BMI in the preceding 2 years in one ACCHO. For all three measures, a greater proportion of women had the result recorded; weight was the most commonly recorded measure (women: 79% vs men: 69%). [Panaretto \*et al.\* \(2013\)](#) reported weight circumference recorded in the preceding 6 months; one in six women had the measure recorded. [Crinall \*et al.\* \(2017\)](#) reported recording for BMI in the preceding 2 years for clients aged 15–34 years, finding no significant difference by gender.

Two studies reported management of weight as a cardiovascular risk factor. Approximately half of participants aged  $\geq 15$  years self-reported a discussion of reaching a healthy weight with a doctor in the preceding 12 months, regardless of weight ([Australian Health Ministers' Advisory Council 2015](#)). [Crinall \*et al.\* \(2017\)](#) reported that for overweight or obese clients aged 15–34 years, 42% of women and 41% of men had a brief intervention recorded, and 13% of women and 8% of men had a referral for weight management recorded.

### Nutrition

No studies reported nutrition assessment. One study reported nutrition management for cardiovascular risk management, documenting 43% of women and 46% of men aged  $\geq 15$  years self-reported discussions with a doctor about healthy food or improving diet in the preceding 12 months ([Australian Health Ministers' Advisory Council 2015](#)).

### Physical activity

No studies reported physical activity assessment. The AATSIHS found 28% of women and 33% of men aged  $\geq 15$  years self-reported a discussion with a doctor about increasing physical activity in the preceding 12 months ([Australian Health Ministers' Advisory Council 2015](#)).

### Alcohol consumption

Six studies reported the age-specific proportion of clients with alcohol consumption recorded in the preceding 2 years. There was consistently a higher proportion of men with assessment across years and age groups; significance was not reported (Hoy *et al.* 2014; Australian Institute of Health and Welfare 2019b).

The AATISHS documented participants aged  $\geq 15$  years having a discussion on drinking alcohol in moderation with a doctor in the preceding 12 months, regardless of alcohol intake. There was variance by gender (women: 8% vs men: 26%) (Australian Health Ministers' Advisory Council 2015).

### Social and emotional wellbeing, including socioeconomic status

No studies reported assessment or management of social and emotional wellbeing factors.

### Biomarkers of diabetes and management of diabetes

Assessment of haemoglobin A1c (HbA1c) was reported in one study, blood glucose in three studies. Hoy *et al.* (2014) reported women aged  $\geq 15$  years were more likely to have HbA1c recorded (65% vs 51% for men) and blood glucose (77% vs 66%) in the preceding 2 years. Crinall *et al.* (2017) found similar results for blood glucose testing to Hoy *et al.* (2014) in young people. Stewart *et al.* (2012) reported 73% of women and 80% of men aged  $\geq 35$  years without diabetes had blood glucose assessed.

Crinall *et al.* (2017) reported 15% of women and 18% of men had a management plan recorded if blood glucose was recorded as elevated in the preceding 2 years for clients aged 15–34 years.

### Biomarkers of chronic kidney disease

Hoy *et al.* (2014) reported recording of eGFR, proteinuria and urinary albumin:creatinine ratio (UACR) for cardiovascular risk assessment in the preceding 2 years. Women had a higher proportion of recording of all three biomarkers for chronic kidney disease compared to men (60% vs 54%).

## Discussion

The evidence suggests major gaps in the provision and management of guideline-recommended preventive cardiovascular care for Aboriginal and Torres Strait Islander women and men. However, there were no major variations in the receipt of assessment and management by gender. Studies reported recording of assessment for cholesterol, BMI, and waist circumference as low as one in three women. Management was only analysed in three studies. Women were less likely to have an intervention on alcohol consumption and younger women were less likely to be

prescribed blood pressure and lipid-lowering medications. Improvements in cardiovascular risk assessment and management have been made over the past decade for Aboriginal and Torres Strait Islander peoples. For example, the proportion of women and men accessing PHC services with information to calculate ACVR and uptake of MBS health assessments have increased substantially over the past 15 years. Despite improvements, in 2018, just over half of all people aged 45–74 years had information available to measure ACVR.

Reporting of risk assessment and management is centred on clinical measures, there is a significant gap in the recording of social, emotional and behavioural protective and risk factors of cardiovascular health (Spurling *et al.* 2017). There were limited data on assessment and management of protective factors such as good nutrition or physical activity. Conversely, smoking and alcohol, behavioural risk factors, were reported in seven and six studies respectively. Reporting these measures of risk may perpetuate assumptions, biases and deficit narratives of Aboriginal and Torres Strait Islander health (Humphery 2001). Women were more likely to have a record of assessment completed for many individual risk factors. However, women were less likely to have a record of alcohol assessment and younger women were less likely to receive an ACVR assessment than men.

### Limitations

A publishing gap in sex and gender-specific data is evident. Twenty-four studies did not meet inclusion criteria as gender-specific data was not included; on follow up, no studies had gender-specific analysis available. Although this review does not identify substantial gender variation in risk assessment and management, data suggest variance in younger ages, which requires further investigating and reporting where sample size permits.

Variance in measures used and methods of measurement prevented meta-synthesis. Future studies into assessment and management of cardiovascular risk should consider benefits of replication for consistency of reporting over time and across services. Another evident gap was reporting of statistical significance of variation by gender, particularly in grey literature. The majority of data reported were accessed from Aboriginal and Torres Strait Islander funded services, with peer-reviewed literature predominately accessing data from ACCHOs. Only one study included data from mainstream general practice. Although quality improvement processes and independent reporting are recognised as beneficial, overburden of reporting on the ACCHO sector has been well-documented (Martin 2015; Finlay 2019). There is concern that a lack of scrutiny is applied to the practice of mainstream GPs with respect to evidence-based guidelines. Future studies could incorporate data from the community-controlled, government and mainstream general practice sectors and compare delivery of services across service type.

## Conclusion

This systematic review sought to synthesise evidence of the provision of assessment and management of cardiovascular health for women without established cardiovascular disease, and compare by gender. There are evidence gaps in the provision of guideline-recommended cardiovascular health assessment and management, regardless of gender. There is opportunity for improving outcomes by addressing these gaps and enhancing assessment and management of cardiovascular risk. Emphasis on reporting of assessment and management sits within a predominantly biomedical frame of risk, with emphasis on monitoring, assessment and management of biomarkers of blood pressure, cholesterol and weight, and smoking and alcohol consumption, not protective behaviours around nutrition and physical activity. There is no evidence in the published literature of integration of social and emotional wellbeing, and little understanding of what assessment and promotion of protective behaviours is undertaken as part of preventive cardiovascular health measures in PHC. The available evidence suggests the opportunity exists to enhance the uptake of preventive cardiovascular care in the primary health setting for Aboriginal and Torres Strait Islander women, in conjunction with a focus on measuring and monitoring a more comprehensive approach to assessment and management.

## Supplementary material

Supplementary material is available [online](#).

## References

- Agostino JW, Wong D, Paige E, Wade V, Connell C, Davey ME, Peiris DP, Fitzsimmons D, Burgess CP, Mahoney R, Lonsdale E, Fernando P, Malamoo L, Eades S, Brown A, Jennings G, Lovett RW, Banks E (2020) Cardiovascular disease risk assessment for Aboriginal and Torres Strait Islander adults aged under 35 years: a consensus statement. *Medical Journal of Australia* 212(9), 422–427. doi:10.5694/mja2.50529
- Aromataris E, Munn Z (Eds) (2020) 'JBI manual for evidence synthesis.' (Joanna Briggs Institute). Available at <https://synthesismanual.jbi.global> [Verified 4 November 2021]
- Australian Health Ministers' Advisory Council (2015) 'Aboriginal and Torres Strait Islander health performance framework 2014 report.' (Australian Health Ministers' Advisory Council: Canberra). Available at [https://www.pmc.gov.au/sites/default/files/publications/Aboriginal\\_and\\_Torres\\_Strait\\_Islander\\_HPF\\_2014%20-%20edited%2016%20June\\_2015.pdf](https://www.pmc.gov.au/sites/default/files/publications/Aboriginal_and_Torres_Strait_Islander_HPF_2014%20-%20edited%2016%20June_2015.pdf) [Verified 4 November 2021]
- Australian Institute of Health and Welfare (2014) 'National key performance indicators for Aboriginal and Torres Strait Islander primary health care: results from December 2013.' (Australian Institute of Health and Welfare: Canberra). Available at <https://www.aihw.gov.au/getmedia/8a6fd74a-634a-488f-bdff-99523a973c26/18427.pdf.aspx> [Verified 4 November 2021]
- Australian Institute of Health and Welfare (2015a) 'Aboriginal and Torres Strait Islander health performance framework 2014 report: detailed analyses.' (Australian Institute of Health and Welfare: Canberra). Available at <https://www.indigenoushpf.gov.au/getattachment/b3517670-6fd1-48ec-b3d5-ebae0642d264/2014-ihpf-detailed-analyses-tier1.pdf> [Verified 4 November 2021]
- Australian Institute of Health and Welfare (2015b) 'Better cardiac care measures for Aboriginal and Torres Strait Islander people: first national report 2015.' (Australian Institute of Health and Welfare: Canberra). Available at <https://www.aihw.gov.au/getmedia/51090f36-7176-48d6-8bad-f3c609b5c8be/19103.pdf.aspx> [Verified 4 November 2021]
- Australian Institute of Health and Welfare (2015c) 'Cardiovascular disease, diabetes and chronic kidney disease: Australian facts - Aboriginal and Torres Strait Islander people.' (Australian Institute of Health and Welfare: Canberra). Available at <https://www.aihw.gov.au/getmedia/e640a6ba-615c-46aa-86d3-097d0dc1d0c3/19548.pdf.aspx> [Verified 4 November 2021]
- Australian Institute of Health and Welfare (2015d) 'National key performance indicators for Aboriginal and Torres Strait Islander primary health care: results from December 2014.' (Australian Institute of Health and Welfare: Canberra). Available at <https://www.aihw.gov.au/getmedia/53b3e015-9ee6-4e22-abe0-dfc4bd7035a4/19276.pdf.aspx> [Verified 4 November 2021]
- Australian Institute of Health and Welfare (2016) 'Better cardiac care measures for Aboriginal and Torres Strait Islander people: second national report 2016.' (Australian Institute of Health and Welfare: Canberra). Available at <https://www.aihw.gov.au/getmedia/7077651a-2194-4d7b-a2c3-242f63b6dcae/19687.pdf.aspx> [Verified 4 November 2021]
- Australian Institute of Health and Welfare (2017) 'National key performance indicators for Aboriginal and Torres Strait Islander primary health care: results from June 2016.' Australian Institute of Health and Welfare: Canberra). Available at <https://www.aihw.gov.au/getmedia/97a128f6-d611-4471-8818-0849867a1b60/20793.pdf.aspx> [Verified 4 November 2021]
- Australian Institute of Health and Welfare (2018a) 'Better cardiac care measures for Aboriginal and Torres Strait Islander people: third national report.' (Australian Institute of Health and Welfare: Canberra). Available at <https://www.aihw.gov.au/getmedia/fac93dd7-1035-4ff9-9c62-70644f7d7bb8/aihw-ihw-197.pdf.aspx> [Verified 4 November 2021]
- Australian Institute of Health and Welfare (2018b) 'National key performance indicators for Aboriginal and Torres Strait Islander primary health care: results for 2017.' (Australian Institute of Health and Welfare: Canberra). Available at <https://www.aihw.gov.au/getmedia/e0f2fc45-cbe4-4c52-a7c1-9a00648b42f2/aihw-ihw-200.pdf.aspx> [Verified 4 November 2021]
- Australian Institute of Health and Welfare (2019a) 'Better cardiac care measures for Aboriginal and Torres Strait Islander people: fourth national report 2018–19.' (Australian Institute of Health and Welfare: Canberra). Available at <https://www.aihw.gov.au/getmedia/657630c2-929f-4038-9d57-9ff05fa33b7c/aihw-ihw-223.pdf.aspx> [Verified 4 November 2021]
- Australian Institute of Health and Welfare (2019b) 'National key performance indicators for Aboriginal and Torres Strait Islander primary health care: results to June 2018.' (Australian Institute of Health and Welfare: Canberra). Available at <https://www.aihw.gov.au/getmedia/7bcf0d06-431f-4cb6-9de0-b847a204cd5a/NKPI-for-Aboriginal-and-Torres-Strait-Islander-Primary-Health-Care-Results-to-June-2018.pdf.aspx> [Verified 4 November 2021]
- Bailie J, Laycock A, Matthews V, Peiris D, Bailie R (2019) Emerging evidence of the value of health assessments for Aboriginal and Torres Strait Islander people in the primary healthcare setting. *Australian Journal of Primary Health* 25, 1–5. doi:10.1071/PY18088
- Banks E, Welsh J, Joshy G, Martin M, Paige E, Korda RJ (2020) Comparison of cardiovascular disease risk factors, assessment and management in men and women, including consideration of absolute risk: a nationally representative cross-sectional study. *BMJ Open* 10, e038761. doi:10.1136/bmjopen-2020-038761
- Better Cardiac Care Forum (2014) 'National recommendations for better cardiac care for Aboriginal and Torres Strait Islander people: post-forum report.' (Australian Health Ministers' Advisory Council: Canberra)
- Crinall B, Boyle J, Gibson-Helm M, Esler D, Larkins S, Bailie R (2017) Cardiovascular disease risk in young Indigenous Australians: a snapshot of current preventive health care. *Australian and New Zealand Journal of Public Health* 41, 460–466. doi:10.1111/1753-6405.12547
- Finlay SM (2019) Understanding the impacts of the national key performance indicators on Aboriginal Community Controlled Health Organisations. PhD (Public Health) thesis, University of South Australia, Adelaide, Australia.

- Harfield S, Pearson O, Morey K, Kite E, Canuto K, Glover K, Gomersall JS, Carter D, Davy C, Aromataris E, Braunack-Mayer A (2020) Assessing the quality of health research from an Indigenous perspective: the Aboriginal and Torres Strait Islander quality appraisal tool. *BMC Medical Research Methodology* 20, 79. doi:10.1186/s12874-020-00959-3
- Hoy WE, Swanson CE, Hope A, Smith J, Masters C (2014) Evidence for improved patient management through electronic patient records at a Central Australian Aboriginal Health Service. *Australian and New Zealand Journal of Public Health* 38, 154–159. doi:10.1111/1753-6405.12195
- Humphery K (2001) Dirty questions: Indigenous health and ‘Western research’. *Australian and New Zealand Journal of Public Health* 25, 197–202. doi:10.1111/j.1467-842X.2001.tb00563.x
- Hyun KK, Redfern J, Patel A, Peiris D, Brieger D, Sullivan D, Harris M, Usherwood T, MacMahon S, Lyford M, Woodward M (2017) Gender inequalities in cardiovascular risk factor assessment and management in primary healthcare. *Heart* 103, 492–498. doi:10.1136/heartjnl-2016-310216
- Martin D (2015) ‘Improving the reporting efficiency for Aboriginal community controlled health organisations: progress over a decade.’ (Deeble Institute for Health Policy Research and Australian Healthcare and Hospitals Association: Canberra). Available at <https://apo.org.au/sites/default/files/resource-files/2015-03/apo-nid53502.pdf> [Verified 4 November 2021]
- Matthews V, Burgess CP, Connors C, Moore E, Peiris D, Scrimgeour D, Thompson SC, Larkins S, Bailie R (2017) Integrated clinical decision support systems promote absolute cardiovascular risk assessment: an important primary prevention measure in Aboriginal and Torres Strait Islander primary health care. *Frontiers in Public Health* 5, 233. doi:10.3389/fpubh.2017.00233
- McBride KF, Rolleston A, Grey C, Howard NJ, Paquet C, Brown A (2021) Māori, Pacific, Aboriginal and Torres Strait Islander women’s cardiovascular health: where are the opportunities to make a real difference? *Heart, Lung and Circulation* 30, 52–58. doi:10.1016/j.hlc.2020.06.029
- Moher D, Liberati A, Tetzlaff J, Altman DG The PRISMA Group(2009) Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *PLoS Medicine* 6, e1000097. doi:10.1371/journal.pmed.1000097
- National Vascular Disease Prevention Alliance (2012) ‘Guidelines for the management of absolute cardiovascular disease risk.’ (National Vascular Disease Prevention Alliance: Canberra). Available at [https://www.heartfoundation.org.au/getmedia/4342a70f-4487-496e-bbb0-dae33a47fcb2/Absolute-CVD-Risk-Full-Guidelines\\_2.pdf](https://www.heartfoundation.org.au/getmedia/4342a70f-4487-496e-bbb0-dae33a47fcb2/Absolute-CVD-Risk-Full-Guidelines_2.pdf) [Verified 4 November 2021]
- Paige E, O’Donoghue Jenkins L, Agostino J, Pennings S, Wade V, Lovett R, Daluwatta A, McLoughlin K, Banks E (2020) Aboriginal and Torres Strait Islander absolute cardiovascular risk assessment and management: systematic review of evidence to inform national guidelines. *Public Health Research & Practice* 30(2), e29231910. doi:10.17061/phrp29231910
- Panaretto KS, Gardner KL, Button S, Carson A, Schibasaki R, Wason G, Baker D, Mein J, Dellit A, Lewis D, Wenitong M, Ring I (2013) Prevention and management of chronic disease in Aboriginal and Islander community controlled health services in Queensland: a quality improvement study assessing change in selected clinical performance indicators over time in a cohort of services. *BMJ Open* 3, e002083. doi:10.1136/bmjopen-2012-002083
- Peiris DP, Patel AA, Cass A, Howard MP, Tchan ML, Brady JP, De Vries J, Rickards BA, Yarnold DJ, Hayman NE, Brown AD (2009) Cardiovascular disease risk management for Aboriginal and Torres Strait Islander peoples in primary health care settings: findings from the Kanyini audit. *Medical Journal of Australia* 191, 304–309. doi:10.5694/j.1326-5377.2009.tb02811.x
- Spurling GK, Bond CJ, Schluter PJ, Kirk CI, Askew DA (2017) ‘I’m not sure it paints an honest picture of where my health’s at’ – identifying community health and research priorities based on health assessments within an Aboriginal and Torres Strait Islander community: a qualitative study. *Australian Journal of Primary Health* 23, 549–553. doi:10.1071/PY16131
- Stewart JM, Sanson-Fisher RW, Eades S, Fitzgerald M (2012) The risk status, screening history and health concerns of Aboriginal and Torres Strait Islander people attending an Aboriginal community controlled health service. *Drug and Alcohol Review* 31, 617–624. doi:10.1111/j.1465-3362.2012.00455.x
- The Royal Australian College of General Practitioners (2018) ‘Guidelines for preventive activities in general practice’, 9th edn. (The Royal Australian College of General Practitioners: East Melbourne). Available at <https://www.racgp.org.au/FSDEDEV/media/documents/Clinical%20Resources/Guidelines/Red%20Book/Guidelines-for-preventive-activities-in-general-practice.pdf> [Verified 4 November 2021]

**Data availability.** Data sharing is not applicable as no new data were generated or analysed during this study.

**Conflicts of interest.** All authors declare no conflicts of interest.

**Declaration of funding.** This work was supported by an NHMRC Postgraduate Scholarship (1134198), an NHMRC Centre of Research Excellence (1044897), an Australian Government Research Training Program Scholarship, and the Commonwealth Scholarships Program for South Australia. AB is funded by an NHMRC Fellowship (1137563).

#### Author affiliations

<sup>A</sup>Allied Health & Human Performance, University of South Australia, Adelaide, SA 5000, Australia.

<sup>B</sup>Wardliparingga Aboriginal Health Equity Theme, South Australian Health and Medical Research Institute, Adelaide, SA 5000, Australia.

<sup>C</sup>College of Medicine and Public Health, Flinders University, Bedford Park, SA 5042, Australia.

<sup>D</sup>Aboriginal Women’s Advisory Group.

<sup>E</sup>Faculty of Health and Medical Sciences, The University of Adelaide, Adelaide, SA 5000, Australia.

<sup>F</sup>Menzies School of Health Research, Casuarina, NT 0811, Australia.

<sup>G</sup>Central Australian Aboriginal Congress, Alice Springs, NT 0870, Australia.

<sup>H</sup>Ngaanyatjarra, Pitjantjatjara, Yankunytjatjara Women’s Council, Alice Springs, NT 0870, Australia.

<sup>I</sup>The Heart Foundation of Australia, Woolloomooloo, NSW 2011, Australia.

<sup>J</sup>Victorian Heart Institute, Monash University, Clayton, Vic. 3168, Australia.

<sup>K</sup>Faculté des Sciences de l’Administration, Université Laval, Québec, QC, G1V 0A6, Canada.