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Social contributors to cardiometabolic diseases in indigenous populations: an international Delphi study

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ABSTRACT

Objective: The objective of this study was to identify priority social factors contributing to indigenous cardiometabolic diseases.

Study design: A three-round Delphi process was used to consolidate and compare the opinions of 60 experts in indigenous cardiometabolic health from Australia, New Zealand and the United States.

Methods: Round one: three open-ended questions: (i) historical, (ii) economic and (iii) sociocultural factor contributors to cardiometabolic disease risk. Round two: a structured questionnaire based on the results from the first round; items were ranked according to perceived importance. Final round: the items were reranked after receiving the summary feedback.

Results: Several key findings were identified: (i) an important historical factor is marginalisation and disempowerment; (ii) in terms of economic and sociocultural factors, the panellists came to the consensus that the socio-economic status and educational inequalities are important; and (iii) while consensus was not reached, economic and educational factors were also perceived to be historically influential.

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Conclusion: These findings support the need for multilevel health promotion policy. For example, tackling financial barriers that limit the access to health-promoting resources, combined with improving literacy skills to permit understanding of health education.

Introduction

Despite Australia (AU), New Zealand (NZ) and the United States (US) being considered 'high-income' countries, the indigenous populations within these countries have much shorter life expectancies than their non-indigenous compatriots.[1–3] This disparity in life expectancy is being driven by heightened incidence of cardiometabolic non-communicable diseases.[4,5] Among indigenous populations, the prevalence of cardiometabolic risk factors, ability to pursue health lifestyle behaviours, access to health care and effectiveness of health promotion strategies have been linked to socioecological factors, including educational attainment and economic circumstance.[6] In turn, educational and economic circumstance has historical underpinnings.[7]

The historical underpinnings of the health gap for many indigenous groups began with colonisation, particularly by Europeans.[7] After colonisation, a common theme among the indigenous populations of AU, NZ and the US has been the dispossession of indigenous lands and resources and vulnerability to exotic disease, leading to marginalisation and dependency on the dominant settler culture.[8,9] This marginalisation has resulted in a loss of traditional lifestyle but has also impacted the access to employment, education, social services and adequate health care.[8,9] The insidious and persistent health threats faced by indigenous populations today are fuelled by the psychosocial and socio-economic aftermath of dispossession.[8]

While significant research has recognized the importance of educational, economic and historical factors, there is a lack of consensus among influential stakeholders as to what should be the key priorities for tackling these challenges. This lack of consensus may be attributable to several factors. First, the poor health status of indigenous populations is caused by a complex combination of determinants.[7] Second, while common inequities are evident across indigenous populations from different countries, there are some determinants unique to specific indigenous populations. Finally, there is a paucity of large-scale, methodologically rigorous interventions designed to improve indigenous health outcomes,[10] and as such, there is a limited evidence base to guide the creation and prioritisation of effective prevention strategies.

The purpose of the present study was to identify the perceived importance of social factors to indigenous cardiometabolic health. Specially, we focussed on educational, socio-economic and historical factors. Influential stakeholders (academics, policy makers, public health practitioners and health workers) from three developed countries, AU, NZ and the US, were surveyed using the Delphi technique. The Delphi technique was originally developed to bring clarity to a complex area in need of a structure,[11] and for this study was used to establish local consensus opinion and initiate dialogue with regard to the creation and prioritisation of effective prevention strategies.

Methods

Findings from this observational study are reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.

Study design

Data for the present study were collected as part of a larger study examining principles and strategies for improving the prevention of cardiometabolic diseases in indigenous populations.[12] With relevance to the present study, between April and August 2015, a three-round Delphi study was used to transform the opinions of a panel of anonymous experts into group consensus. The panellists were asked about (i) historical, (ii) economic and (iii) sociocultural factor contributors to cardiometabolic disease risk. For each round, the panellists were emailed a country-specific hyperlink to complete a web-based (Qualtrics, Utah, US) questionnaire. Panellists were given 3 weeks to complete each round and were emailed a reminder on weeks two and three. Three weeks was allocated for analysis between rounds. The approval was obtained from the ethical committees of Massey University in NZ (MUHECN 14/052), Western Carolina University in the US (2015-0132) and Curtin University in AU (HR39/2015). The AU panellists completed an online consent form before participation, whereas for the NZ and US panellists, consent to participate in the Delphi survey was implied by completion of the questionnaire.

The Delphi technique

The Delphi technique (Fig. 1) is characterized by three features: anonymity, iterative and controlled feedback and aggregation of responses. Anonymity reduces the effects of dominant individuals, a limitation of other group-based processes.[13] For each round of questions the responses are summarized, and controlled feedback was provided to the experts before completing the subsequent questionnaire. This 'questionnaire–feedback' process encourages the panel to become more problem-solving oriented and minimizes noise and is repeated until consensus has been obtained.[11] While up to six rounds of questionnaires have been used, three rounds

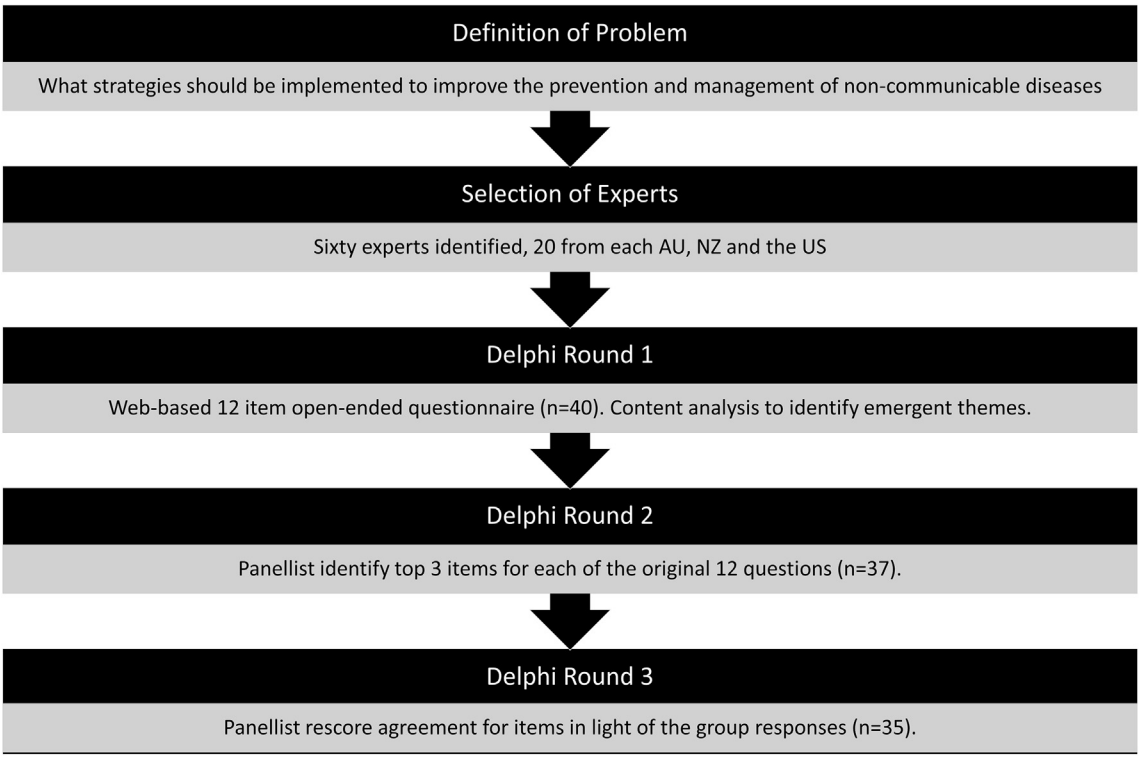

Fig. 1 – Outline of the Delphi process. Data collection period: April–August, 2015. NZ, New Zealand; AU, Australia; US, United States.

are often sufficient to reach consensus.[14] For the purpose of the present study, consensus was defined as all three panels (AU, NZ, US) prioritising an item.

Expert panel

Experts were recruited from a range of disciplines to provide a wide breadth of perspectives from influential stakeholders. For inclusion on the panel, participants were required to meet at least two of the following four criteria: (i) published in indigenous cardiometabolic health; (ii) extensive practical experience in indigenous cardiometabolic health; (iii) demonstrated professional interest in indigenous cardiometabolic health; (iv) considerable experience in indigenous cardiometabolic health management. An initial list of approximately 50 potential participants was composed from each country using snowball sampling. From the final list, 20 potential panel members from each country were selected, attempting to ensure adequate representation across the inclusion criteria.[13] Contact was made with each of the potential panel members before initiating the study to ensure that they met the criteria and were able to participate in all the three rounds.

Round 1 questionnaire

The first round of questions was exploratory (open ended), serving as a cornerstone for soliciting specific information. Care was taken to ensure that these broad questions were clearly understood by the panel, with the final draft sent to indigenous consultants from each country (M.H. from NZ, J.J. from the US and L.D. from AU) for an independent review.

The responses to each question from round 1 were independently analysed by the primary researcher from each country (L.S. from NZ, L.P. from the US and A.M. from AU) using content analysis.[15] To cluster the data about similar topic areas, similar responses were grouped and appropriated to a theme. Subsequently, an auditor from each country (A.M. from NZ, J.R.J. from the US and A.Mc. from AU) was asked to analyse the grouped responses and approve or question the emergent themes. After this independent review, the primary research team (L.S. from NZ, L.P. from the US and A.M. from AU) met to identify the 'core ideas' within each theme and reduce the data. The primary research team then discussed the core ideas until the group arrived at consensus regarding their content and wording and converted the core ideas into questionnaire items. For each item, an example attribute was assigned to ensure clarity, e.g., item = historical factors, attribute = related to colonisation and institutional racism. The final draft was then sent to an indigenous consultant from each country (M.H. from NZ, J.J. from the US and L.D. from AU) for an independent review.

Round 2 questionnaire

The second round questionnaire retained the original 12 questions. However, rather than being open ended, each question had a number of closed-ended items (ranging from 7 to 10 items per question) based on the summary responses from

round 1. The panellists were asked to select the top three items (priorities) to establish preliminary priorities and to provide a rationale for their responses. Items prioritized by all three panels were regarded as key priorities. Any items not selected as a priority by at least one of the three panels were removed.

Round 3 questionnaire

Each question for the final questionnaire included the top three items (priorities) for each country (five items per question). The priorities were rank ordered, using the percentage of total responses across the three countries. For this round, the panellists were provided with the opportunity to revise their top three priorities. To determine the final ranking, the top three priorities from each panellist were scored: rank 1 = 3 points, rank 2 = 2 points, and rank 3 = 1 point. The priority with the highest total point allocation was rated as the highest priority.

Results

Recruitment and participants

After email communication with the lead members of the research team (A.M., L.G.P., L.S.), 60 expert panellists agreed to participate in this study, including 20 panellists from each country. Of these 60 panellists, 40 completed round 1, 37 completed round 2 and 35 completed round 3. All 60 panellists were invited to complete each round, and the research team was blinded as to who completed each round. Demographic and occupational information for the panellists who completed round 3 are reported in Table 1. The make-up of the panel who completed round 1 was similar to the round 3 panel, including 12 from AU, 16 from NZ, 12 from the US, 70% female, 48% Caucasian, 43% indigenous, 95% English speaking, 18% indigenous speaking and 73% in an academic profession.

Table 1 – Demographic and occupational characteristics of participating experts who completed the final round.

Category	AU	NZ	US	Total	%
N	13	12	10	35	100
Sex					
Male	4	4	2	10	29
Female	9	7	8	24	69
NR	0	1	0	1	3
Age (yrs)					
35–44	3	3	0	6	17
45–54	4	4	3	11	31
55–64	7	4	5	16	46
64+	1	1	2	4	11
Ethnicit(ies)					
Caucasian	10	3	6	19	54
Indigenous	3	7	4	14	40
Pasifika	0	1	0	1	3
Hispanic	0	0	1	1	3
African American	0	0	1	1	3
NR	0	1	0	1	3
Language(s)					
English	13	12	9	34	97
Indigenous	0	6	0	6	17
Spanish	0	0	1	1	3
French	0	1	1	2	6
Tongan	0	1	0	0	0
Profession					
Academic	7	7	7	21	60
Medic	1	2	0	3	9
Nurse	2	0	1	3	9
Health promoter	1	0	0	1	3
Health service provider	3	1	0	4	11
Hospital admin	0	0	1	1	3
Unemployed	0	1	0	1	3
NR	0	1	0	1	3

NZ, New Zealand; AU, Australia; US, United States; NR, not reported.
Data collection period: April–August, 2015.

Q1 Historical factors

Ten items emerged (Table 2), which were reduced to five after round 2 and maintained through round 3. One key priority emerged: a primary historical factor influencing cardiometabolic health is marginalisation and associated disempowerment. Marginalisation and disempowerment was regarded as the second lowest priority in round 1 and the fourth highest priority after round 2.

Q2 Economic factors

Seven items emerged (Table 3), which were reduced to five after round 2 and three following through round 3. The panels came to the consensus that the most significant economic factors are (i) poverty and poor employment opportunities (regarded as the key priority through all rounds); (ii) high costs of healthy foods; and (iii) educational inequalities.

Q3 Sociocultural factors

Nine items emerged (Table 4), which were reduced to five after round 2 and four after round 3. Two key priorities emerged: the most important sociocultural factors are (i) low socio-economic status (SES) (listed as a priority for round 2 but not round 1); and (ii) poor education.

Key differences between countries

The three panels agreed on the top three priorities for Q2 (economic factors) but only on one priority for Q3 (sociocultural) and two factors for Q1 (historical). For Q3, only the AU panel recognized 'factor related to mental health' as a key priority. For Q1, only the US recognized 'educational inequalities' and 'discriminatory laws and policies' as a key priority.

Discussion

The purpose of this research was to facilitate dialogue on the creation and prioritisation of strategies for improving indigenous cardiometabolic health. Specifically, the Delphi technique was used to survey influential stakeholders and identify the perceived importance of educational, economic and historical factors. Several key themes emerged:

Table 2 – Local panel rankings for question 1: The most significant historical factors contributing to cardiometabolic disease risk in indigenous people.

Item	Rd 1	Rd 2	Rd 3	Ranking			
	$n = 40$	$n = 37$	$n = 35$	All	AU	NZ	US
Colonisation	69	21	23	1	2	1	
Economic inequalities	13	28	25	2	1	2	
Marginalisation and disempowerment	2	18	23	3	3	3	1
Educational inequalities	9	20	20				2
Discriminatory laws and policies	9	12	14				3
Discriminatory health services	1	16					
Racism	21	10					
Psychological trauma	14	9					
Loss of family structure	3	7					
Genetic predisposition	8	6					

NZ, New Zealand; AU, Australia; US, United States; Rd, round.
n = number of times a response was listed for a given theme. Note for round one: for a given theme, a panellist member may have provided more than one response, e.g., a panellist may have stated the (i) loss of traditional lifestyle and (ii) loss of land, for 'colonisation'. Data collection period: April–August, 2015.

i. an important historical factor is marginalisation and associated disempowerment;
ii. in terms of economic and sociocultural factors, the panellists came to the consensus that the economic status (socio-economic status, poverty, poor employment) and educational inequalities are important; and
iii. while consensus was not reached, economic and educational factors were also perceived to be historically important.

Comparison with other studies

It is well established that the indigenous populations of AU, NZ and the US have poorer health status than non-indigenous populations across numerous measures of SES.[16–18] For example, in NZ there is a greater proportion of the indigenous population living in more deprived geographic areas, having lower household incomes and attaining lower formal education than those of European descent.[19] Low SES has also been associated with being less physically active, more time spent watching television, lower awareness of healthy nutrition and consumption of a higher proportion of saturated fats and processed sugars.[19] Some of the ways that SES can impact health include (i) the high cost of healthy foods compared with convenience foods; (ii) low-income families tend to live in neighbourhoods with poor physical infrastructure, including less access to green spaces and recreational facilities; and (iii) low-income families may not be able to afford to compensate for poor neighbourhood infrastructure by paying for alternative physical activities.[20] The importance of socio-environmental determinants was recognized by the panel members from each country, with one NZ panel member stating that there is a need to '… improve access to health-promoting environments e.g., regulation of food, alcohol and tobacco, and provision of safe neighbourhoods that allow for improved outdoor activity' and another from the US iterating the need to focus on '… upstream approaches, e.g., taxing sugar, no advertising [of] unhealthy food, [limit] children's TV'.

The indigenous groups of AU, NZ and the US attain substantially lower levels of education than their non-indigenous counterparts.[21–23] For example, in NZ, only 59% of the indigenous population completed high school in 2014, compared with 81% of the European descent population. The relationship between education and cardiometabolic health parallels

Table 3 – Local panel rankings for question 2: The most significant economic factors contributing to cardiometabolic disease risk in indigenous people.

Item	Rd 1	Rd 2	Rd 3	Ranking			
	$n = 40$	$n = 37$	$n = 35$	All	AU	NZ	US
Poverty and poor employment opportunities	52	31	34	1	1	1	1
High costs of healthy foods	15	26	29	2	2	2	2
Educational inequalities	6	23	27	3	3	3	3
High cost of housing	10	17	11				
Cost of health care	9	14	3				
Related to colonisation	3	13					
High costs of recreation facilities	9	9					

NZ, New Zealand; AU, Australia; US, United States; Rd, round.
n = number of times a response was listed for a given theme. Note for round one: for a given theme, a panellist member may have provided more than one response, e.g., a panellist may have stated (i) low household income and (ii) low minimum wage, for 'poverty and poor employment opportunities'. Data collection period: April–August, 2015.

Table 4 – Local panel rankings for question 3: The most significant sociocultural factors contributing to cardiometabolic disease risk in indigenous people.

Item	Rd 1	Rd 2	Rd 3	Ranking			
	$n = 40$	$n = 37$	$n = 35$	All	AU	NZ	US
Low socio-economic status	4	25	30	1	1	1	1
Poor education	4	19	24	2	3	2	2
Loss of cultural identity	24	18	17	3		3	3
Factors related to mental health issues	5	16	13		2		
Neighbourhood deprivation	7	18	18				
Lack of culturally aware indigenous medical practitioners	9	15					
Racism	21	12					
Loss of family structure	2	9					
Poor role models	2	9					

NZ, New Zealand; AU, Australia; US, United States; Rd, round.
n = number of times a response was listed for a given theme. Note for round one: for a given theme, a panellist member may have provided more than one response, e.g., a panellist may have stated (i) low SES and (ii) material deprivation, for 'colonisation'. Data collection period: April–August, 2015.

those for income, whereby lower levels of educational attainment are associated with a higher prevalence of cardiovascular risk factors, higher incidence of cardiovascular events and higher cardiovascular mortality.[24] Educational attainment may directly or indirectly influence health outcomes. An example of a more direct impact is where having less than a high school education has been associated with low health literacy, which in turn has been associated with poorer health outcomes.[25] While an example of an indirect impact is articulated by a NZ panellist, 'low education completion rates for indigenous peoples reduce their chances of getting [a] well-paid job' resulting in lower income prospects.[22] In turn, low income impedes the access to nutritious food, safe housing, a good working environment and social participation.[26]

Although mental health issues did emerge as an economic factor for each subpanel after round 1, only AU ranked this factor as a priority in the final round. There is a well-established body of literature which documents associations between mental health and cardiovascular disease (CVD) risk.[27] However, the reason for mental health only being recognized as a priority by the AU subpanel is unclear. Mental health disorder is a major issue for the indigenous populations of each country, with each reporting approximately double the prevalence for indigenous versus non-indigenous groups.[19,21,28,29] The AU panellist did state that Aboriginal Australians suffer from 'high chronic intergenerational stress levels' and that this may be '…. a result of colonization and the stolen generation'. The AU panellists also stated that they continue to be treated '… as second class citizens (or not even citizens)', and they are concerned about 'top-down decisions with lack of consultation with indigenous people (e.g, Northern Territory intervention; threat of closing remote communities)'. These remarks refer to the 'stress' of discriminatory policies which are in living memory, including not being counted in the census until 1967;[30] various acts of Parliament which permitted the 'Stolen Generations' to occur between 1906 and 1969[31] and the currently enforced 2007 Northern Territory National Emergency Response, which, according to the United Nations, is racially discriminating and infringes on the human rights of aboriginal people.[32] Moreover, these remarks suggest the mental health first aid should be a particularly important component of health promotion in AU.[33]

It has been argued that persistent and unequal health threats faced by indigenous populations today are still influenced by the psychosocial and socio-economic aftermath of the dispossession of indigenous land and resources.[8] After dispossession, the indigenous populations of AU, NZ and the US were marginalized and became a minority culture within the colonial society.[8] Marginalisation not only led to the loss of traditional lifestyle and exposure to exotic disease but also led to poor access to employment, education, social services and adequate health care.[8,9] Health inequalities across numerous outcomes still persist in indigenous populations, meaning these populations begin life with a lower baseline of opportunity.[34] Moreover, they face forms of 'institutional racism' wherein government and other power systems systematically exclude or marginalize social groups.[35] Such marginalisation limits political participation, reduces control over external influencers[36] and presents a major barrier to self-determination and empowerment.[37]

Policy implications

The findings of the present study are in line with the growing body of evidence demonstrating that health promotion strategies are unlikely to be successful if they are implemented in isolation of other interventions.[38] For example, indigenous groups are unlikely to access health-promoting resources if there are financial barriers and are unlikely to digest health education without appropriate literacy skills. Therefore, it is unlikely that the indigenous health gap will be resolved by tackling an independent factor but rather requires a 'holistic healthcare approach' (AU panellist) across '… multi levels' (NZ panellist). According to one NZ panellist, 'the causes of cardiometabolic diseases are complex and multifaceted; hence, a similarly multilevel approach targeting Whānau [extended family] and community is required'. This is particularly important for indigenous people without the financial means, health literacy or experience to navigate their way through Westernized healthcare systems.

While there is clear evidence supporting the need for multilevel health promotion strategies, there is still the question of who should be responsible for developing and funding policies to address the socio-economic and sociocultural determinants of indigenous health.[39] Considering the

historical underpinnings of the health gap for many indigenous groups began with colonisation,[7] an argument can be made that federal governments should claim direct responsibility. Such attempts have been made in NZ, where initiatives to support Māori development and improve health outcomes have been designed through central government, including actions through the Waitangi Tribunal to compensate Iwi (tribes) for the land that was taken from them by the European settlers.[40] However, many question the role of government in providing services, arguing that indigenous people should be supported in the development of their own solutions, rather than having solutions imposed on or provided for them.[39] For example, in AU, a history of discrimination and displacement from land, culture and family has generated a feeling of mistrust among the indigenous people,[41] and such mistrust may prevent the government from gaining sufficient traction to effectively address the indigenous health gap. Arguably, where the government should claim responsibility is in funding and evaluating indigenous healthcare and promotion initiatives. For instance, the implementation of the Apunipima Cape York Health Council, the largest community-controlled health organisation in the state of Queensland, AU, has led to increased access to healthcare services, and the serviced communities are outperforming the national key performance indicators.[42] Furthermore, in NZ, there have also been policy attempts to enable local ownership of health services through Māori-for-Māori health providers in the primary care.[43] These localized examples are not exhaustive and do not fully address the question as to who should be responsible for developing and funding indigenous health policy; however, these examples do support the need for continued and deeper discourse.[42]

Strengths and limitations of this study

This study had several potential limitations. First, the three panels (AU, NZ and US) did not come to consensus for two of the three questions. While an additional round could have been implemented, the lack of agreement is an important finding in itself, likely reflecting the unique historical, institutional, sociocultural and environmental determinants of health experienced by each specific indigenous group within their country context. These findings indicate that while indigenous populations across AU, NZ and the US are facing a number of similar challenges, these populations are not monolithic and require tailored health prevention strategies. Second, there was attrition of panellists with each round, which may have reduced the breadth of opinions in subsequent rounds. Nonetheless, the attrition was minimal ($n = 5$) and was unlikely to have resulted in substantial bias. Finally, the opinions of the respondents may not be representative of all influential stakeholders. However, every attempt was made to ensure broad representation, and we believe that the opinions generated by this study are valuable in stimulating necessary dialogue.

Conclusion

The Delphi technique was used to survey influential stakeholders and identify the perceived importance of educational, economic and historical factors to indigenous cardiometabolic health. Several key themes emerged: (i) an important historical factor is marginalisation leading to disempowerment; (ii) in terms of economic and sociocultural factors, the panellists came to the consensus that the economic status and educational inequalities are important; (iii) the experts did not fully agree on the most important historical and sociocultural factors. The lack of full agreement supports the notion that poor indigenous cardiometabolic health is a 'complex problem' with many causative factors and that health prevention strategies are unlikely to be successful if they are implemented in isolation of other interventions. Furthermore, while economic and educational inequalities are important targets, intervention strategies should be contextualized to the local indigenous populations.

Author statements

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Ethical statement

Approval was obtained from the ethical committees of Massey University in NZ (MUHECN 14/052), Western Carolina University in the US (2015-0132) and Curtin University in AU (HR39/2015). This study was conducted in accordance with the ethical standards of the institutional and/or national research committees and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

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Competing interests

None declared.

Author contributors

L.S., A.M., L.G.P. and A.Mc. designed the initial survey. L.S., A.M. and L.G.P. analysed the findings. M.H., J.R.J. and L.D. provided indigenous consultation. A.G.M., J.R.J. and A.Mc. audited the responses from the round one. All authors participated in the analysis and interpretation of the data, revision of the article and final approval of the version to be published. L.S. is the guarantor. All authors had full access to all of the data, including statistical reports and tables, and can take responsibility for the integrity of the data and the accuracy of the data analysis.

Data sharing

All data generated or analysed during this study is available on request.

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