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Connection between food, body and mind

Scott Teasdale, Wolfgang Marx, Molly Warner, Flavia Fayet-Moore and Skye Marshall

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Contents

About the cover artwork:

Artist: Linda Huddleston

Title: The journey towards healing

At the centre of the artwork is the Clearinghouse. The black half-circles are the people who come to the Clearinghouse for information about mental health and suicide prevention.

The waves of red, yellow and white dots surrounding the inner circle represent strength and healing.

The footprints represent the journey towards healing.

The red and white circles around the edge represent different programs and policies aimed at helping people heal.

The hands represent success and wellbeing.

Summary

Connection between food, body and mind

What we know

- Sourcing traditional foods directly from the land supports the social and emotional wellbeing of Aboriginal and Torres Strait Islander people (Indigenous Australians).
- The ongoing process of colonisation has decreased the opportunities for hunting and gathering.
- Indigenous populations have less access to locally available, seasonal whole foods, which are beneficial to mental and physical health.
- Nutrition and food-related skills and knowledge are core components of lifestyle interventions believed to improve mental wellbeing in Indigenous communities.

What works

Nutrition programs in Indigenous communities work well when they are:

- culturally appropriate and community-endorsed
- co-designed with Elders
- facilitated by an Aboriginal Health Worker and supported by visiting specialists
- delivered in a safe community environment
- delivered in a group program to reap the benefits of social connections
- practical workshops based on traditional foods that have high diet quality
- flexible in their delivery with transportation provided.

What does not work

- Designing and delivering programs without the input and endorsement of Indigenous communities—including Elders, Aboriginal Health Workers, and other Aboriginal Health Professionals—does not work.
- Focusing on short-term programs with limited culturally relevant nutritional content or knowledge-based programs without a practical and interactive delivery does not work.
- Programs that lack local cultural consideration and don't have social connectedness and community endorsement can fail to achieve long-term engagement.

What we don’t know

- There is not enough evidence to recommend using nutrition-focused interventions to treat suicide and suicidal thoughts.
- There is limited understanding of how effective culturally relevant nutrition interventions could be for mental health and suicide prevention because these aspects are rarely studied in the same program.
- It is not possible to draw conclusions about how effective individual nutrition interventions are. This is because many are co-delivered beside other lifestyle-related content (e.g. physical activity, smoking cessation) to meet the needs of the communities they served.
- The cost-effectiveness of these programs is not known. Neither is the extent to which they can be scaled to more communities.

1

Introduction

1 Introduction

The mental health burden experienced by Aboriginal and Torres Strait Islander people (hereafter Indigenous Australians) is a major health-care concern. Indigenous Australians experience psychological distress at a rate 2.5 times that of non-Indigenous Australians (ABS 2019a), and the rates of death by suicide are about twice that of non-Indigenous Australians (ABS 2019b).

There is growing evidence to suggest that diet quality and adequate nutrition could improve mental health (Firth et al. 2019). Many community and research-based programs have addressed nutrition in Indigenous Australians. Few have been able to identify either the specific effect of nutrition or the main features that should be included in a nutrition program.

This report evaluates the effects of dietary and nutritional interventions on mental health and suicide risk in Indigenous Australians. Specifically, it reviews grey and peer-reviewed literature to answer the following research question commissioned by the Australian Institute of Health and Welfare (AIHW):

> In Aboriginal and Torres Strait Islander people, what is the acceptability, feasibility, and effectiveness of dietary and nutritional interventions on mental health and suicide prevention?

The report also supports Action 13 of the Fifth National Mental Health and Suicide Prevention Plan (the Fifth Plan) (COAG 2017), which commits governments to strengthen the evidence base needed to improve mental health services and outcomes for Indigenous Australians.

The report identifies the information, policies and programs for these aspects of nutrition and mental health. It identifies what has been evaluated, what works, what does not work, and where the gaps and limitations are in the evidence to inform future programs.

2

Background

2 Background

Adequate food supply and a high quality diet are essential for health and wellbeing (WHO 1998). Shortages in food supply and variety lead to issues of nutrient deficiencies (under-nutrition) and growth and development. Over-nutrition drives chronic diseases such as cardiovascular disease and diabetes (WHO 1998). Both under- and over-nutrition are linked to poorer mental wellbeing (WHO 1998).

In general, Indigenous Australians as a population group are consuming a diet of low nutritional quality that does not meet the Australian Dietary Guidelines. The Australian Dietary Guidelines are based on scientific evidence. They recommend the amounts and kinds of foods and food groups that all healthy Australians should eat to promote health and wellbeing. The guidelines aim to decrease the risk of diet-related conditions (e.g. high cholesterol) and chronic diseases (e.g. type 2 diabetes) (NHMRC 2013).

The guidelines include the Australian Guide to Healthy Eating, which is a visual representation of specific foods and the proportion of the food groups to consume every day (NHMRC 2013).

What the data say about diet quality

Data from the 2012–13 National Aboriginal and Torres Strait Islander Nutrition and Physical Activity Survey revealed that Indigenous Australians have:

- poor diet quality
- an insufficient intake of nutrient-dense foods from the 5 core food groups in the Australian Dietary Guidelines
- excessive consumption of discretionary foods and beverages that are high in added sugars, salt and fat.

For example, Indigenous Australians consumed an average of 1.8 serves of the core food group 'vegetables and legumes/beans' per day. This is much lower than the recommended 5–6 serves per day (ABS 2016; NHMRC 2013).

Fruit intake was half the recommended 2 serves per day, and a third of that came from fruit juice. Fruit juice is considered to be high in 'free sugars', so intake should be limited (WHO 2015). Only a quarter of grain-based foods (cereals including bread, breakfast cereal, pasta, rice, tortilla) consumed were from wholegrain or high-fibre varieties.

The most consumed discretionary foods and drinks were alcohol and soft drinks. An average of 6.1 serves of discretionary foods and drinks were consumed daily, which is 41% of the recommended total daily energy (calorie) intake.

The data also showed regional differences in diet quality. For example, Indigenous Australians living in non-remote areas consumed more fruit (1.3 daily serves) than those living in remote areas (0.9 daily serves) (ABS 2016; NHMRC 2013).

Mental health

Mental health among Indigenous Australians

The rates of mental illness experienced by Indigenous Australians is a major health-care concern. The burden of psychological distress is at a rate 2.5 times that of non-Indigenous Australians. Hospitalisations for mental and behavioural disorders are 1.7 times the rate of that for non-Indigenous Australians (ABS 2019a). For depression alone, the prevalence in 2019 was 22% for Indigenous Australians and 10% for the Australian population in 2017–18 (ABS 2019a).

According to the Australian Burden of Disease Study, mental health and substance use disorders are the leading cause of disease burden for Indigenous Australians. These disorders account for almost a fifth of the total disease burden experienced (Al-Yaman 2017), which is 2.4 times the rate for non-Indigenous Australians.

Dietary patterns, diet quality, chronic disease and mental health

Nutrition, chronic disease and mental health are connected. Poor mental health—such as stress, anxiety, and negative emotions—can drive unhealthy eating behaviours, reduce diet quality, and increase the risk of chronic disease (Singh 2014). Beyond increasing the risk of chronic disease, these dietary patterns are likely to exacerbate poor mental health and self-harm behaviours such as suicide (Lazarevich et al. 2016).

Greater focus is often given to chronic disease management. The comorbidity with mental health problems is under-recognised in Indigenous Australian primary health care settings (Schierhout et al. 2013). In addition, food insecurity is considerably more prevalent in Indigenous Australians (22%) than in non-Indigenous Australians (3.7%) (ABS 2015). This in itself can be a driving factor for stress and anxiety, and poor diet quality (Davy 2016).

A growing body of research demonstrates that improving diet quality can improve not only chronic disease outcomes but mental health (Firth et al. 2019; Lassale et al. 2019). Healthy dietary patterns have been consistently linked to a lower risk of mental illness, particularly depression (Lassale et al. 2019).

In contrast, a low-quality 'Western dietary pattern' of energy-dense but nutrient-poor fast foods and drinks has been linked to a higher risk of depression (Li et al. 2017). This could be a result of inadequate nutrient status, increased obesity rates, or the more recently understood mechanism that links less healthy dietary patterns to unfavourable changes in the microbiome, increased inflammation in the body, or a combination of these (Marx et al. 2020).

Randomised controlled trials indicate that an intervention that improves diet quality could directly reduce depressive symptoms (Opie et al. 2017). Recently, a 5-year study of women from the Australian population found that women whose diets were more similar to the Australian Dietary Guidelines had reduced depressive symptoms (Opie et al. 2020). Three well-designed, randomised controlled intervention trials in the general Australian population reported similar findings. Participants with depression significantly improved depressive symptoms after improving their diet quality when compared with control group who received only social support (Francis et al. 2019; Jacka et al. 2017; Parletta et al. 2019).

A small number of studies have explored the relationship between food, eating and mental health in Indigenous Australians. A study in urban New South Wales found that Aboriginal children and adolescents who ate at least 2 serves of vegetables each day were twice as likely to have good mental health than those who ate less than 2 serves of vegetables each day (Williamson et al. 2016).

The environment has an important influence on diet quality (Berger et al. 2018). For example, Torres Strait Islanders from the island of Mer had better diet quality and better mental health than Torres Strait Islanders from the island of Walben. This difference was thought to be related to the high dietary intake of fish and the very limited availability of Westernised fast foods and convenience stores on the island of Mer. In contrast, people on the island of Walben had high access to Westernised foods (Berger et al. 2018). The link between blood fatty acids (high omega-6/omega-3 ratio) and depressive symptoms strengthened the theory of dietary differences being linked to depression levels. Sex and body mass index (BMI) were included as covariates, but other confounding factors such as physical activity level were not. This limited the strength of the conclusions (Berger et al. 2018).

Indigenous Australians have described the link between dietary patterns, diet quality and mental health as the strong interrelationship between traditional foods, hunting and gathering, culture, and social and emotional wellbeing (Crowe et al. 2017; Waterworth et al. 2015).

Suicide risk

Suicide and Indigenous Australians

Suicide is the fifth leading cause of death for Indigenous Australians. It accounted for 5.5% of Indigenous Australians' deaths, compared with 2.0% of deaths for non-Indigenous Australians (ABS 2019b). The suicide rate of 24 deaths per 100,000 people is also twice that of non-Indigenous Australians (12 per 100,000 people) (ABS 2019b), and it appears to be increasing.

Indigenous Australian children and young adults are particularly at risk of suicide. Among Indigenous Australians, the median age of people who die by suicide is 32 years (for males) and 26 years (for females). Suicide accounts for nearly a quarter of all Australian child deaths (23.8%) and more than a quarter (26.5%) of all Indigenous Australian child deaths (ABS 2019b).

Dietary patterns, diet quality and suicide risk

The role of diet quality in the risk of suicide and suicidal thoughts has not been as well researched as that for depression risk. In the general population, people who had ever attempted suicide reported lower quality diets than those who had not. Omega-3 fatty acids, found primarily in seafood, have also been found to reduce suicide risk (Guu et al. 2020).

Specifically, several authors (Li et al. 2009; Zhang et al. 2005) found that people who had ever attempted suicide reported lower intakes of:

- core food groups such as fruits, vegetables and meat
- nutrients such as polyunsaturated fat
- dietary fibre.

Caution is needed: there is no evidence for using specific dietary interventions as a primary strategy to lower suicide risk.

Disruptions to traditional diet and food systems

Indigenous Australians' concept of health is holistic. It encompasses connections with food, body, mind, community, family, and kinship (Crowe et al. 2017; Waterworth et al. 2015). Before colonisation, dietary intake consisted of locally available, seasonal whole foods such as native land animals, birds, fish, seafood, insects, fruits, berries, roots, plants, seeds and nuts (Gracey 2000). These are beneficial to both mental and physical health (O'dea 1984; Samson & Pretty 2006).

As Australia became increasingly occupied by European settlers, the traditional dietary patterns and hunter–gatherer traditions of sourcing food directly from Country were disrupted and skills such as hunting were not as widely used or passed on to later generations (Gracey 2007). Reading & Wien (2009) found that the mental health and diet quality of many Indigenous Australians is negatively influenced by:

- the drastic and purposeful disruption to dietary patterns
- disconnection from Country
- deskilling as hunters and gatherers
- the changed environment for cooking and mealtimes.

Dietary patterns are now typically characterised by energy-dense, processed foods that are high in added sugars, salt and fat; refined cereal products; and high fat domesticated meat (Global Burden of Disease 2017 Risk Factor Collaborators 2018).

The need for appraisal

The Australian Human Rights Commission highlighted that restoring health includes making healthy lifestyles available to Indigenous Australians (Calma 2005). A 'healthy lifestyle' needs to be defined by Indigenous Australians for a program or policy to be culturally relevant.

Rather than just using the Australian Dietary Guidelines, recognition of the broad and diverse traditional foods is also a prerequisite for any meaningful intervention to address holistic lifestyle programs for Indigenous Australians. Re-establishing the connection with food, body and mind is likely to be an important factor in the prevention and treatment of mental illness in Indigenous Australians (Gracey 2007).

In 2009, guidelines for health workers, clinicians, consumers and carers that focus on Indigenous Australians state that improvements to drinking, nutrition, exercise, and smoking behaviours should be used in the treatment of mild depression (Haswell-Elkins et al. 2009). There has been no discussion of nutrition in more recent guidelines. To ensure the successful delivery of nutrition interventions that address mental health challenges in Indigenous Australians, there is a need to systematically evaluate the design, delivery and efficacy of nutrition interventions in this population.

3

Policy context

3 Policy context

Guidelines, strategies and policies at all levels of government have attempted to improve dietary quality for Australians generally and for Indigenous Australians specifically. **Appendix A** lists national and state guidelines and strategies that incorporate nutrition.

The Australian dietary guidelines (NHMRC 2013) are relevant to Aboriginal and Torres Strait Islander peoples. However, NHMRC also provide specific recommendations for Indigenous populations. In particular, the guidelines encourage the consumption of traditional bush foods.

The National Aboriginal and Torres Strait Islander Nutrition Strategy and Action Plan (NATSINSAP) was signed off by the Health Ministers in 2001. It was designed to build on existing efforts to make healthy food choices easier choices for Indigenous peoples, irrespective of where they live. Active cooperation and support of a range of other sectors is required to ensure effective implementation (National Public Health Partnership 2001).

Appendix A also includes 4 national and state-level policies and frameworks that targeted mental health and suicide and included a role for nutrition.

- National Strategic Framework for Aboriginal and Torres Strait Islander Peoples' Mental Health and Social and Emotional Wellbeing 2017–2023 (PM&C 2017)
- Fifth National Mental Health and Suicide Prevention Plan (COAG 2017)
- National guide to a preventative health assessment for Aboriginal and Torres Strait Islander people, 3rd ed. (NACHHO & RACGP 2018)
- Strategic Framework for Suicide Prevention in NSW 2018–2023 (Mental Health Commission of NSW 2018)
- Balit Murrup: Aboriginal Social Emotional Wellbeing Framework (Victorian Department of Health and Human Services 2017)

The effectiveness of these policies and frameworks on nutritional intake and subsequent mental health and suicide rates were not addressed in the current review.

4

Relevant programs and initiatives

4 Relevant programs and initiatives

A systematic search of published and grey literature was performed as reported in **Appendix C**. Programs eligible for inclusion were interventions, initiatives, or programs that:

- included a core nutrition or dietary component
- reported a mental health outcome
- was delivered to Indigenous Australians, or Indigenous people of Canada, the USA, and other Pacific regions.

There was no restriction on type of nutrition or dietary intervention. Programs that solely addressed food access and did not address nutritional adequacy or nutritional intake were excluded (food insecurity is addressed in a separate clearinghouse document).

The search identified 19 eligible studies reporting on 16 programs.

Of those, 11 delivered nutrition-focused content to Indigenous Australians. Reports from the grey literature included websites by the Australian government and community organisations. The review also identified 5 programs that delivered nutrition content to Indigenous people of Canada, the USA, and other Pacific regions.

A description of the study design, participants, intervention, findings, and study quality of these included programs are summarised in **Appendix B** and briefly described here.

One program had a primary focus on suicidal thoughts, and another had a primary focus on depression (together with obesity). Other programs included secondary focuses such as depression and anxiety, quality of life, components of social and emotional wellbeing and morale. Only 1 of the programs that delivered nutrition content also covered suicidal thoughts.

This poor focus is consistent with the lack of observational studies exploring the link between nutrition and suicide in Indigenous Australians. The target groups within programs were split evenly in terms of how many had a chronic disease condition (or who were at a high risk) and those who did not. The programs that did not target a chronic disease condition generally involved school-aged children and youths.

The study quality of published peer-reviewed literature was appraised using the Academy of Nutrition and Dietetics Quality Criteria Checklist (QCC), which rates studies as having negative, neutral, or positive quality (Academy of Nutrition & Dietetics 2012). The study quality of grey literature was appraised using the Authority, Accuracy, Coverage, Objectivity, Date, Significance (AACODS) Checklist, with a score ranging from 0 (low quality) to 6 (high quality) (Tyndall 2010).

Australian programs

Social Emotional Wellbeing (SEWB) and suicidal ideation Program

The headspace National Youth Mental Health Foundation (headspace) in Queensland partnered with the Suicide Prevention and Mental Health Program, an open forum led by Elders, to develop the 6-week program for youths aged 11–21 years.

The program was a group-based intervention for suicide prevention that was culturally validated and community-endorsed. It was delivered by 4 education sessions of 1 hour each. One session was about healthy lifestyles. Participants also engaged in 1 hour of physical activity and shared a healthy meal that had accompanying nutrition advice. During this time, program facilitators modelled holistic health, including the mental health benefits of physical activity and a healthy diet.

Evaluation

The SEWB program was evaluated by Skerrett et al. (2018). The evaluation used quantitative analysis at baseline, post-intervention, and at 2-months follow-up. Suicidal ideation (General Health Questionnaire—Suicide) was the primary outcome.

The program increased:

- the understanding of physical and mental health
- the number of referrals to headspace Inala.

Suicidal thoughts had decreased significantly at the end of the program; however, this improvement was not maintained when participants were followed up again 2-months after the program ended.

Waminda's Wellbeing Program

This program was run by the Department of Health and Ageing, Local Community Campaign initiative in Waminda, Nowra, NSW, Australia.

It provided transport to holistic healthy lifestyle program sessions that included 1 hour of physical activity followed by cooking demonstrations, cooking competitions, and healthy eating information sessions aiming to prevent and manage chronic diseases. The timing and delivery of sessions were flexible. The program also involved community gardens, smoking cessation support, and women's camps that included workshops, activities, education, and the process of yarning around a campfire.

Evaluation

Waminda's Wellbeing Program was evaluated by Firth et al. (2012) using cyclical action research. About 94% of the program participants were Indigenous Australian women. The program used the Growth and Empowerment Measure (GEM) to monitor participants' social and emotional health and wellbeing. Although the GEM data were not published, facilitators reported improvements in the participants' confidence, self-esteem and general wellbeing. Participants reported enjoying the social connection, having a laugh, improved energy and motivation.

Work it Out

The Work it Out program was developed with the local Indigenous Australian community as part of an integrated system of care for chronic disease. The program was a holistic 12-week chronic disease self-management program delivered as 2-hour sessions twice a week. The sessions included a 45-minute 'yarn' with 4 different health professionals, one of which was a dietitian discussing healthy eating. In addition, participants had the opportunity to meet in a 1-to-1 scenario with the health professionals for additional support. The participants also completed a 1-hour exercise session with an accredited exercise physiologist or physiotherapist.

Evaluation

The Work it Out program was evaluated by Nelson and others (2016) and Mills and others (2017). These evaluations found that participants were more likely to use general practitioners (GPs) for mental health consultations than people who did not take part in the program.

Themes from qualitative assessments found improvements in emotional wellbeing, social connectedness and confidence. Participants reported enjoying life more. Some reported a decrease in feelings of depression or anxiety and being better able to cope with challenges in life.

Aunty Jean's Good Health Team

This 12-week program consisted of weekly sessions aiming to promote, support and sustain health behaviours for Indigenous Australians with chronic and complex care needs. Topics included goal setting, physical activity, chronic disease, self-monitoring, signs and symptoms, coping with illness, stress and setbacks, and diabetes education. There were 2 nutrition-related sessions:

- 'Talking Tucker', which involved food models, presentation slides and information sheets
- 'In the Kitchen', which was a low-fat cooking demonstration.

The program had 5 key priority areas, one of which was to 'improve social and emotional wellbeing'.

Evaluation

The program was evaluated by Curtis et al. (2004) using a participatory evaluation of the pilot program. Fifteen Elders were recruited through a lunch to participate in and co-facilitate the program. 'Modest improvement' was reported in quality of life (family and social support); 'Significant improvement' was reported for feelings (undefined) and social activities.

Deadly Choices

The Institute for Urban Indigenous Health, the University of Queensland, and the Lowitja Institute delivered the program in South East Queensland, to adults and children in school and community settings. The 7-week program involved weekly 90-minute sessions encouraging healthy choices, especially in relation to chronic diseases and their risk factors (nutrition, physical activity, smoking, and harmful substances). The nutrition session covered the food groups and portion sizes, reducing sugary drinks, energy balance, the importance of breakfast, and healthy meal options.

Evaluation

Deadly Choices was evaluated by Malseed (2013). The program improved leadership ability and confidence to make 'deadly choices' (that is, good choices), and improved attitudes and self-efficacy. Many changes were sustained at 4 to 6 months. Authors recommended a mental health component to be specifically incorporated into the program.

EON Thriving Communities Program

The not-for-profit EON Foundation delivered the program to primary and high school students in 24 communities in Western Australia and the Northern Territory. The intensive, grassroots gardening, cooking and nutrition program was based around developing large, edible gardens in remote schools and communities. It also provided training and capacity-building for the locals to maintain the gardens.

The program aimed to reduce preventable chronic disease caused or compounded by poor nutrition and its social consequences by:

- working with communities fortnightly for 3 to 5 years to establish gardens and build capacity
- delivering nutrition education, training and skills to effect generational change
- improving social, physical and emotional wellbeing in community members and engaging at risk children in learning.

Evaluation

The EON Foundation (2017) completed an evaluation report using mixed methods. Students reported feeling calm in the garden, enjoying cooking, and eating fruit and vegetables to make them feel 'brainy', happy, healthy and having more energy. Almost all (96%) of the teachers reported positive changes in the attitudes and behaviours of students. Delivery over multiple years enhanced the sustainability of the program.

Girls Academy

Girls Academy is a collaboration between Aboriginal Youth Development Program, Role Models, Leaders Australia, and Nestlé Australia Pty Ltd. The program has been delivered in 42 schools to 2,600 Indigenous Australian girls in New South Wales, Queensland, Western Australia and the Northern Territory.

Girls Academy aims to address the inequality in investment in school-based engagement programs for Indigenous Australian girls. The objectives are to increase school attendance, advance academic and personal achievement, improve Year 12 graduation rates, and facilitate post-school transitions.

The multifaceted program involves accomplished local Indigenous Australian women mentoring individuals and groups. There are health-focused sessions and workshops on nutrition and healthy cooking, but these sessions are not well described.

Evaluation

Girls Academy (2020) completed an informal evaluation report using mixed methods. The evaluation reported improved educational outcomes leading to a better quality of life. Qualitative data from participants' feedback implies a stronger sense of social connectedness due to the Girls Academy initiative.

Healthy Eating and Active Living Indigenous Groups (HEALInG)

The HEALInG program was developed through the Northern NSW Local Health District. From 2003 to 2010, the 10-week program was delivered to more than 100 Indigenous Australians. Transport was provided to weekly sessions consisting of 1-hour of physical activity, followed by a provided lunch, and a 90-minute learning session.

The program was adapted from an existing Queensland Health Indigenous Healthy Weight Program. A difference was that the HEALInG program was framed positively and focused on healthy eating rather than weight loss. Five sessions included healthy eating topics:

- dietary guidelines, food groups, serving sizes
- fats and sugars in food
- reducing the amount of fat, sugar and salt in meals
- how to make meals healthier
- budgeting for balanced meals
- understanding food labels.

Two groups were cancelled due to lack of participants and 'sorry business' (grieving of community members). Barriers to maintaining health behaviours were financial difficulties, insecure housing, unstable relationships, and personal issues.

Evaluation

The NSW Health Department (2004) published an evaluation report on the 2003–2004 program delivery. The evaluation report used explorative and formative qualitative research involving 11 of the women participating. A key finding was increased self-esteem. Participants also had an increased knowledge of nutrition.

Jamie's Ministry of Food

The UK-based program was adapted to the Australian context with the support of Queensland Health. It was then specifically adapted to Indigenous Australian communities of Cherbourg and Mossman Gorge in Queensland (Flego et al. 2014). Jamie's Ministry of Food aims to provide an engaging community-focused program to teach basic cooking skills and good nutrition to non-cooks with an overall aim to improve quality of life and health. Food trainers collaborated with Indigenous Australian leaders in each community to provide a 5-week program of 12-person, weekly cooking workshops for more than 300 Indigenous Australians in total.

Evaluation

Two case studies (Mossman Gorge, n = 173 participants; Cherbourg, n = 186 participants) and a mixed methods longitudinal study with intervention and wait-list control group (Ipswich, n = 931 participants) have been reported (Flego et al. 2014; The Good Foundation 2016; Jamie's Ministry of Food Australia 2015, 2016). For the general Australian population, increased self-efficacy and social connectedness was sustained at 6 months after the program ended. Self-esteem measures improved during the program. Qualitative evaluation suggested a positive flow-on effect of 'bringing families together'.

My Health for Life

My Health for Life is delivered across more than 11 health services in Queensland. It is supported by Queensland Health, Diabetes Queensland, the Heart Foundation, the Stroke Foundation, 7 Queensland Primary Health Networks, the Ethnic Communities Council of Queensland, and the Queensland Aboriginal and Islander Health Council (QAIHC) (Queensland Government 2016). The Queensland Health Prevention Strategic Framework 2017 to 2026 was considered by the program during its design and delivery.

This 6-month healthy lifestyle program aims to reduce the risk of chronic disease. Participants choose either a fortnightly group program format or individual telephone coaching.

In designing the program, the QAIHC represented Aboriginal Medical Services throughout Queensland and provided guidance to ensure the My Health for Life program was suitable for Indigenous Australian communities. QAIHC supports the program's engagement with various Indigenous Australian organisations throughout Queensland. It also helps train Indigenous Australian facilitators to deliver a culturally appropriate modified version of the program.

Evaluation

Evaluation data were collected at 3 times during the 6 months of the program. Outcomes included nutrition and mental health data and are ongoing through Griffith University. A progress report for the Health and Wellbeing Strategic Framework 2017 to 2026 incorporated some preliminary findings for My Health for life in 2017–2018 for 2,211 Indigenous Australian participants (Queensland Health 2018).

Findings were as follows:

- 22–31% reported an increase in confidence to make healthy behaviour changes (at sessions 5 and 6 of program)
- 97% reported an intention to make lifestyle change (at sessions 5 & 6)
- 19% who were overweight or obese achieved 5% weight loss or more
- 45% reduced their waist circumference
- 45% met Australian physical activity guidelines in the previous week
- 44% increased their daily fruit serves
- 53% increased their daily vegetable serves
- 35% reduced sugar-sweetened beverage consumption.

Tucka-time

Tucka-time has been delivered in 6 schools (30 students per school) in regional, rural, and remote areas of Queensland, Australia. The 10-week program aims to improve knowledge and skills around healthy eating, budgeting, shopping, cooking, mental health and wellbeing. Students participated in cooking classes, toured a local supermarket, attended information sessions presented by a dietitian and a psychologist, and received their own take-home set of cooking equipment.

Evaluation

An informal process evaluation was conducted in 2016. This and other informal mid-program evaluations report that participants expressed an improved confidence to prepare food at home with their families. A formal evaluation is ongoing as the program is currently active until June 2020, so evaluation reports are not yet available.

International programs

Belcourt Youth Activities Program/National Youth Sports Program

The Belcourt Youth Activities Program/National Youth Sports Program (BYAP/NYAP) is a summer group education prevention program was delivered to Turtle Mountain Chippewa Tribal members in North Dakota. The 4-week program targeted youth aged 7 to 18 years and addressed factors of ill health, lack of education, poverty and poor nutrition. Participants attend 5 days per week, for 4 hours each day, to cover topics of nutrition education, exercise, suicide prevention, tobacco prevention, drug and alcohol prevention, and career outlook and opportunity. The nutrition education used 'Rezipe' food guide and specifically addressed the link between nutrition and mental health. Participants received nutritious meals at the program.

Evaluation

A post-program survey (Martin 2015) found that 58% of respondents reported improved morale either multiple times per week or daily.

Healthy Children, Strong Families

Healthy Children, Strong Families was delivered to adults and children in tribal communities in Wisconsin. The program provided a healthy lifestyle and nutrition education intervention toolkit either through mentoring and social support (intervention group) or through mailed information (control group). The nutrition content focused on increasing fruit and vegetable intake as well as reducing added sugar intake. The program included stress management content for adults. It addressed lifestyle behaviours for all participants.

Evaluation

Two randomised controlled trials evaluated the program (Tomayko et al. 2016; Tomayko et al. 2019). A mental health score improved for participants in both the intervention and control groups in the first randomised controlled trial (n = 150) but not the second (n = 450). There was no effect on stress in adults.

Kahnawake School Diabetes Prevention Program (KSDPP)

KSDPP, delivered in Mohawk territory in Canada, aimed to reduce the incidence of type 2 diabetes by delivering 5 intervention components, including:

- the Healthy Mind in a Healthy Body component, which focused on nutrition and traditional foods
- the Haudenosaunee Food Cooking Workshop, which developed cooking skills using traditional foods.

The program covered other lifestyle behaviours, including mindfulness, physical activity, cultural traditions and spirituality, and social connectedness.

Evaluation

A qualitative evaluation of 17 adult females and one key informant was published in 2019 (Murdoch-Flowers et al. 2019). The evaluation reported an improved holistic concept of health and wellbeing, including mental, physical, spiritual, and social dimensions. There was little detail about the content of nutrition interventions, and no validity evidence for the measure of mental health. These 2 concerns mean that the caution is required to prior to considering translating the program to other contexts.

Together on Diabetes

This multisite program was delivered to 4 tribal communities in South-Western USA for American Indian youth at high risk of diabetes. The program was developed and implemented in partnership with tribal communities and included a support person for participants (identified by the participant).

The 12-month aimed improve psychosocial, knowledge, behavioural and physiological outcomes. It was split into a 2 phases:

- 6-month intensive phase (12 lessons of 45–60 minutes each, delivered twice a week)
- 6-month maintenance phase (monthly 20-minute maintenance sessions).

The program included 3 components: home-based education and support; collaboration with medical providers; and referrals to community resources and wellness events. Lessons were delivered in the participants' homes and focused on nutrition, physical activity, and life skills with accompanying goal setting.

Evaluation

Pre- and post-quantitative assessments were published in 2016 (Kenney et al. 2016). At the end of 12-months, participants had significantly improved their quality of life and reduced depressive symptoms. This might not be related to nutrition-focused content because dietary intake did not improve.

The model appears feasible and effective due to the year-long intervention period and its retention rate of 85%. The split between an intensive phase and maintenance phase could have improved the feasibility and acceptability. It possibly makes the program more scalable to other areas.

Wellness coaching program

Women from American Indian/Alaskan Native, Pacific Islander, Hispanic/Latino, African American and African immigrant communities were trained in MI-based wellness coaching and served as community wellness coaches for their respective communities.

Participants received 12 months of either low- or high-intensity coaching:

- High-intensity participants engaged in monthly group activities and monthly individual coaching sessions in addition to receiving educational materials.
- Low-intensity participants received an individual session every 4 months and no group activities.

The coaching was weight inclusive. Nutrition content focused on improving fruit and vegetable intake.

Evaluation

A quantitative evaluation was published in 2018 (Sunada 2018). Depression prevalence decreased from 21.7% to 9.5% over the 12-month intervention. Women consuming fruits and vegetables 5 or more times per day were more likely to improve their depression symptoms compared to women who consumed fruits and vegetables less than 5 times per day. Women with worse depression symptoms were more likely to decrease their waist circumference as a result of the program.

5

Overarching approaches and best practice

5 Overarching approaches and best practice

A systematic review (Schembri et al. 2016) of nutrition interventions for Indigenous Australians reported the following factors to be important for success:

- practical cooking workshops
- group education sessions
- store-level interventions
- newsletters with recipes and nutrition tips
- community involvement in program implementation
- involvement of Indigenous Australian health workers
- environmental changes such access to healthy foods and safe community spaces to be active
- improved access to health-care services
- combining nutrition with physical activity interventions.

Magnus et al. (2016) reported that a 20% discount on water, diet drinks, fruits, and vegetables, individually or in combination with each other, improved diet quality and had modest effects on disability-adjusted life years. Financial modelling found the strategy to be cost-effective. While it is plausible that mental health could improve given the improvements in diet quality and disability-adjusted life years, mental health outcomes were not measured.

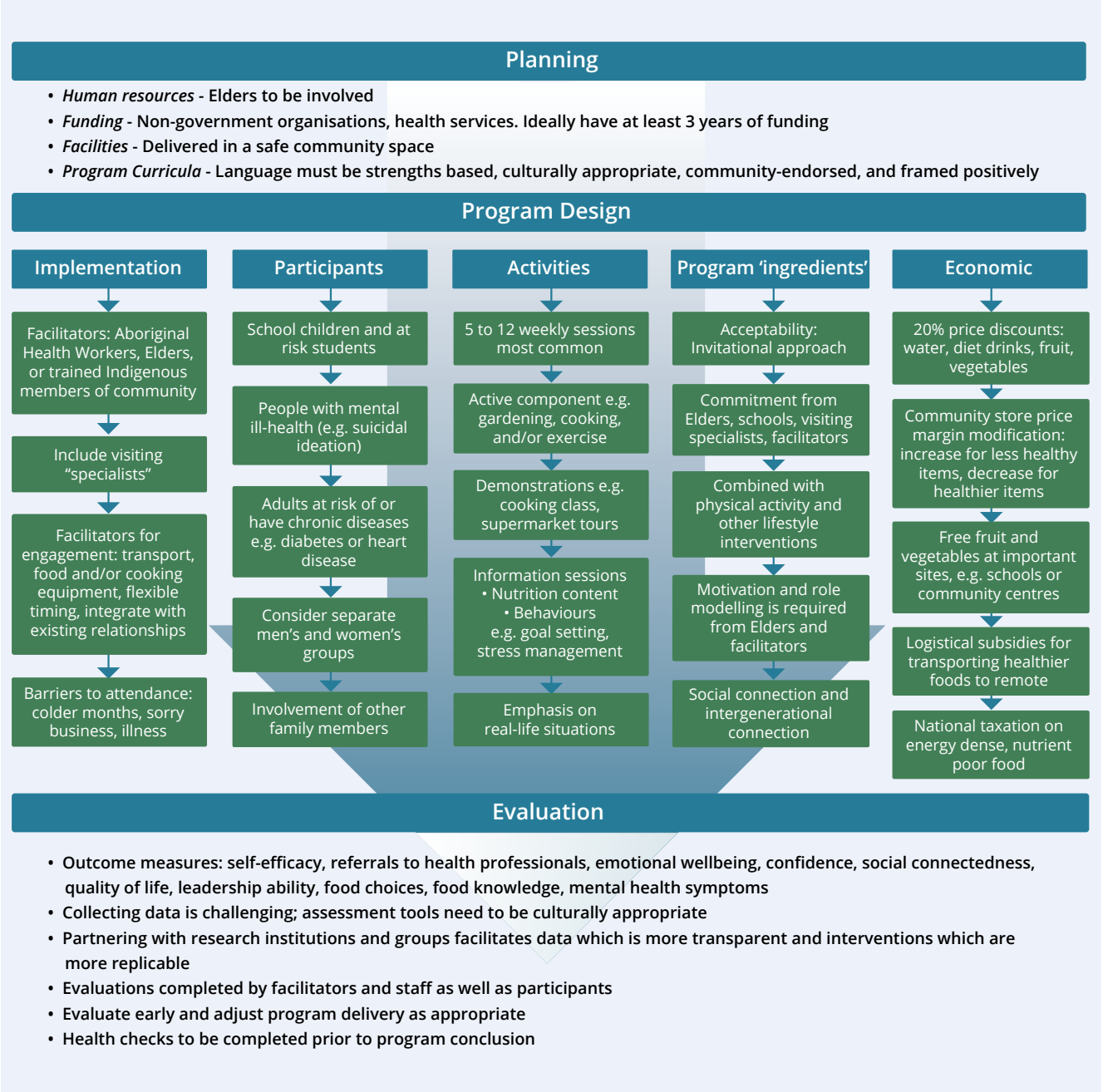
Lee et al. (2009) reported economic strategies that could be considered in combination with a downstream nutrition intervention to improve mental health. They included:

- free fruit and vegetables in certain settings (remote schools)
- modifying price margins in stores within the communities (a price increase on less healthy items and decrease on healthier items)
- logistical subsidies for transporting healthier foods to remote communities
- greater differential national taxation on energy-dense, nutrient-poor foods and drinks (a fat or sugar tax).

This report used a method of constant comparison to identify cross-cutting strategies to inform planning, design and evaluation of nutrition programs that aim to improve mental health in Indigenous Australians. These cross-cutting strategies were developed into a framework (Figure 1).

Economic strategies were informed by Lee et al. (2009) and Magnus et al. (2016).

Figure 1: A framework of cross-cutting strategies for the planning, design and evaluation of nutrition interventions to improve mental health in Aboriginal and Torres Strait Islander people



6

Gaps and limitations

6 Gaps and limitations

This report provides good evidence that nutrition is a valued and important component of any lifestyle program for Indigenous Australians. It shows a definite role for traditional foods and sourcing food directly from the land in social and emotional wellbeing. Because Indigenous Australians see health as holistic, a change in any area of health or lifestyle is expected to promote greater wellbeing.

The evidence this report presents for the effect of diet on mental health should be considered as preliminary. This is because

- Few of the programs have been rigorously evaluated for mental health and suicide outcomes, and few used control groups for comparison.
- Most programs were rated as having neutral (neither strong nor weak) methodological quality.
- The quality of the interventions delivered by the identified programs was also limited.

Most of the programs were evaluated using a cross-sectional design, which cannot describe whether participants had any improvement at the end of the program compared to the beginning of the program. This limits the understanding of the treatment potential of culturally relevant nutrition interventions for mental health and suicide.

The potential to translate programs that were valued and acceptable to participants is limited by the poor reporting of program materials. Many of the programs were delivered by community and government organisations, so it is possible that their facilitators might be available to provide more information to any group hoping to adapt the program into their own communities. In addition, programs delivered to Indigenous people of Canada, the USA and other Pacific regions have not been studied for potential use in Indigenous Australian communities.

Despite minimal evidence of cost-effectiveness, several programs were well placed for scalability—the ability to be expanded to a greater population in 'real world' conditions—and translatability to more Indigenous Australian communities.

To support the holistic approach to health and wellbeing valued by Indigenous Australians, nutrition interventions were co-delivered alongside other lifestyle-related content. While this prevents conclusions being drawn about the relative effect of each program component, it does emphasise the importance of using a holistic and multidisciplinary approach in an Indigenous community setting.

Opportunities for strengthening evidence

There is a need for well-designed intervention studies to test the effect of community-based nutrition and lifestyle interventions on mental health, wellbeing, and suicide (rates and thoughts) in Indigenous Australians.

Observational cohort studies should be performed to examine the link between dietary intake and mental health and suicide in this population group. Evaluation of intervention programs using valid dietary intake assessment and mental health measures before and after program implementation as well as economic evaluations would substantially strengthen the evidence.

Assessment of quality of life should be considered an important aspect of mental health, alongside assessment of anxiety and depression symptoms. Assessment measures should be culturally sensitive and relevant, such as observation of dietary intake rather than food diaries, and quality of life visual analogue scales rather than long questionnaires.

Due to the importance of cultural relevance and addressing barriers to participation, qualitative evaluation should accompany quantitative data. A control group should be used for comparison in a culturally sensitive study design such as stepped-wedge or cluster randomised controlled trial. Reporting interventions and supporting materials according to the Template for Intervention Description and Replication (TIDieR) checklist (Hoffmann et al. 2014) will improve adaptation and translation to local communities. Due to the importance of programs being community-driven, research, community and government organisations should collaborate to meet the research gaps, help publish the research for maximum public health impact, and ensure cultural appropriateness.

Why addressing these gaps is important

Improving the nutritional status through increased use of traditional foods and social meal environments would take advantage of a strong component of Indigenous Australian culture in a way that would facilitate social and emotional wellbeing. Colonisation has had dramatic effects on sources of food and nutritional intake, and this is partly driving a significant reduction in social and emotional wellbeing.

Addressing the identified evidence gaps would allow a confident recommendation to include nutrition and food-focused intervention programs for physical and mental health. This could assist in reducing morbidity and mortality rates in Indigenous Australian communities and reduce demand on the health-care system and the associated health-care costs. To underpin this process, meaningful definitions and interpretations of wellbeing and healthy lifestyles need to be defined by the Indigenous Australian community rather than by the current government or non-Indigenous people.

7

Conclusions

7 Conclusions

Key messages: what works

The impact of colonisation on deskilling Indigenous Australians as hunter gatherers who source food directly from Country has been well described, as has the resulting negative effect on mental health. There is sufficient preliminary evidence to support nutrition and food-related skills and knowledge being included as a core component of lifestyle interventions for the improvement mental wellbeing in Indigenous Australian communities. However, there is insufficient evidence to recommend nutrition-focused interventions as a method to address suicide and suicidal thoughts.

This report has reviewed programs and initiatives from both the peer-reviewed scientific literature and grey literature to identify key facilitators that would support the delivery of nutrition programs. Nutrition programs in Indigenous communities are more effective when they are:

- culturally appropriate and community-endorsed
- co-designed with Elders
- facilitated by an Aboriginal Health Worker and supported by visiting 'specialists'
- delivered in a safe community environment
- delivered in a group program to reap the benefits of social connections
- inclusive of practical workshops based on traditional foods that have high diet quality
- flexible in their delivery and have transportation provided.

Implications for policy, practice and further research

Currently, nutrition is not routinely listed as a risk factor in Commonwealth or state policies, strategies or guidelines that address mental health and suicide in Indigenous Australians. Although there is sufficient evidence to recommend nutrition programs as a key mental illness and suicide prevention and treatment strategy, nutrition should be recognised as having an important role in any policy, strategy or guideline that aims to improve mental health through lifestyle behaviours. All future policies, strategies and guidelines on mental health should include nutrition as a risk factor. Further, poor diet quality should be specifically recognised as a risk factor for poor mental health among Indigenous Australians.

To improve the mental health of Indigenous Australians, more research is needed to properly understand:

- the role nutrition plays in suicide and suicidal ideation (suicidal thoughts)
- the effect that nutrition and food-focused interventions have on a range of mental health and suicide outcomes, including symptoms of depression, mood and anxiety
- the cost-effectiveness, scalability and translatability of nutrition-focused lifestyle strategies to reach a larger number of Indigenous Australian communities
- strategies to ensure sustainability and long-term impact.

To meet these research needs, healthy lifestyles and concepts of wellbeing need to be defined by Indigenous Australians so studies can model programs and evaluation criteria. Cohort and intervention studies that accurately assess dietary intake and mental health, quality of life, and suicide outcomes and cost-effectiveness outcomes should be prioritised to provide empirical evidence to support appropriate community funding. Finally, there is a need for more research to evaluate adaptation and replication of studies in different Indigenous communities.

Appendixes

Appendix A: Policies and frameworks

Table A.1: Description of policies and frameworks

Name	Details	Key recommendations	Implementation
Australian Dietary Guidelines 2013 Aboriginal and Torres Strait Islander Guide to Healthy Eating	Describes the types and amounts of foods, food groups, and dietary patterns for health. The 3 key aims are: • improve health and wellbeing • reduce risk of diet-related conditions such as obesity, elevated cholesterol and blood pressure • reduce the risk of chronic diseases such as cardiovascular disease and diabetes.	The Aboriginal and Torres Strait Islander Guide to Healthy Eating tries to make the dietary guidelines relevant to Indigenous Australians but includes few sources of traditional foods and was not based on any scientific examination of Indigenous traditional dietary patterns. This action plan is not specific to mental health but encompasses overall wellbeing.	The Aboriginal and Torres Strait Islander Guide to Healthy Eating was implemented in 2013 via www.eatforhealth.gov.au. The guide provides clinical education tools to promote improved nutritional practices via a number of freely available tools. There is no documented evidence that Indigenous Australians were involved in developing the guide. Information for the impact on nutritional intake of Indigenous Australians as a result of the guide was not identified in this review.
National Aboriginal and Torres Strait Islander Nutrition Strategy and Action Plan 2000–2010 (NATSINSAP) (Strategic Inter-Governmental Nutrition Alliance 2001)	The NATSINSAP was developed by the National Aboriginal and Torres Strait Islander Nutrition Working Party The NATSINSAP aimed to improve the health of Indigenous Australians by improving nutritional intake.	A key objective was to address the numerous social, economic, geographical, environmental, and infrastructural barriers that affect dietary intake. This action plan is not specific to mental health but encompasses overall wellbeing.	The NATSINSAP led to: • including nutrition as a core unit in Indigenous Australian Health Worker training • developing specialist Indigenous nutrition courses in 5 universities • expanding the nutrition section of the HealthInfoNet, a national conference for Indigenous Australian nutrition and health-promotion workers • implementing a large-scale food-security project.

Table A1 (continued): Description of policies and frameworks

Name	Details	Key recommendations	Implementation
National Strategic Framework for Aboriginal and Torres Strait Islander Peoples' Mental Health and Social and Emotional Wellbeing 2017–2023	This framework is intended to guide and inform Indigenous mental health and wellbeing reform (PM&C 2017). It provides a framework for action in response to the high incidence of social and emotional wellbeing problems and mental ill-health.	**ACTION AREA 1**—Promote wellness **Outcome 2.4:** Indigenous children and young people get the services and support they need to thrive and grow into mentally healthy adults Nutritionists and dietitians are also listed as part of the action: 'potential reach of a social and emotional wellbeing team'.	Gayaa Dhuwi, the current leadership group for Indigenous mental health and SEWB in Australia, is responsible for steering implementation.
Fifth National Mental Health and Suicide Prevention Plan (the Fifth Plan)	**Developed by:** Department of Health **Years**: 2017–2021 **Region:** National The Fifth Plan embodies a commitment by all governments to improve the planning and service delivery of mental health and suicide prevention services. Consumers and carers are central to the way services are planned, delivered and evaluated. Nutrition was acknowledged as a core risk factor for the development of physical health problems in people with mental illness, but there was no link with mental health (apart from eating disorders) or suicide.	Improving Indigenous Australians' mental health and suicide prevention is Priority Area 4. Governments have committed to: • co-design services with Aboriginal communities, improving referral pathways to services and ensuring a strong Indigenous Australian leadership within the local mental health service • establish an Indigenous Mental Health and Suicide Prevention Subcommittee to provide advice on a range of strategies, such as a nationally agreed approach to suicide prevention to Indigenous Australians • improving Indigenous Australians access to, and experiences of, mental health and wellbeing services by increasing the knowledge of social and emotional wellbeing concepts and improving the cultural competencies and capability of mainstream providers • strengthen the evidence base needed to improve mental health services and outcomes for Indigenous Australians through processes such as a clearinghouse of resources, tools and program evaluations.	The Fifth Plan has been implemented and commits all governments to work together. Evaluation likely to occur at the completion of the implementation timeframe (2021).

(continued)

Table A1 (continued): Description of policies and frameworks

Name	Details	Key recommendations	Implementation
National guide to a preventative health assessment for Aboriginal and Torres Strait Islander people, 3rd ed.	The national guidelines were developed by the National Aboriginal Community Controlled Health Organisation and the Royal Australian College of General Practitioners A practical resource on best-practice preventative health care for all health professionals delivering primary health care to Indigenous Australians.	Chapter 1 is focused on lifestyle. It incorporates nutrition and the Australian Dietary Guidelines. Nutrition is also addressed in Chapters 2, 3, 4, 5, 11 and 12 in the context of the life stages for disease management and prevention, growth and development, wellbeing, cardiovascular disease, and type 2 diabetes prevention and early detection. There was no clear inclusion of nutrition in Chapter 17, which is focused on mental health.	The publication is intended for use as a general guide only. Impacts specifically related to this guide were not identified in this review.
Strategic Framework for Suicide Prevention in NSW 2018–2023	The framework was developed by the Mental Health Commission of NSW and NSW Ministry of Health in collaboration with people with lived experience. The framework has a vision of 'Everyone in NSW lives with hope, wellbeing and good health, with fewer lives lost through suicide'.	The framework includes goals, priority action areas, guiding principles and strategic guidance to direct activities in New South Wales until 2023. Eating well (among other lifestyle components) is highlighted under Priority Area 1: 'Building individual and community resilience and wellbeing'. The document does not include action items or targets that are specifically related to nutrition or diet quality.	The framework was implemented in 2018. The framework commits the NSW government to work alongside the Australian Government, Primary Health Networks, Local Health Districts, and community managed organisations. Evaluation of the frameworks impact was not identified in this review but may occur at the completion of the frameworks timeframe (2023).
Balit Murrup: Aboriginal Social Emotional Wellbeing Framework 2017–2027	The framework was developed by Aboriginal Social and Emotional Reference Group Balit Murrup is part of the Victorian Government's commitment to providing a long-term vision to improve social and emotional wellbeing and mental health of Indigenous Australians in Victoria.	The framework's vision is: 'Victorian Aboriginal people, families and communities achieve and sustain the highest attainable standards of social emotional wellbeing and mental health'. Healthy diet and nutrition are included as an example of protective and enabling factors as part of the 'connection to body' dimension of the social and emotional wellbeing dimensions. The document details the department's commitments to enable reform: resourcing; measuring success; implementation, governance and accountability; monitoring and evaluating outcomes using the Aboriginal governance and accountability framework; and continuing reform.	The framework has been implemented and is currently active. Details for the impact of this framework were not identified in this review.

Appendix B: Programs

Table B.1: Methods and description of programs and their associated evaluations

Program	Program details		Evaluation[a]	Evaluation details		Evaluation outcomes
Social Emotional Wellbeing Program 1-hour weekly education sessions on SEWB and 1-hour exercise each session. Nutrition education was incorporated in healthy lifestyle topic. Participants shared a healthy meal with nutrition advice after exercise.	Location(s)	Inala, Qld	Skerret et al. (2018) Single-arm intervention study	Location(s)	headspace Inala	• Accepted by local Aboriginal community • Referrals to local headspace increased • Suicidal ideation (GHQ-Suicide) decreased from 1.7 (2.7) to 0.8 (1.8), p = 0.0008 post-program • No significant changes in self-esteem, anxiety, or depression • Study may be underpowered • Findings were not significant at 2-month follow-up
	Participants	11–21 years old 41% females		Participants	75 commenced 61 completed 49 follow-up	
	Duration	6 weeks		Duration	Pre, post and 2-month follow-up	
	Indigenous specific	Yes		Indigenous specific	Yes	
Waminda's Wellbeing Program Holistic healthy lifestyle program with physical activity and healthy eating education sessions. Nutrition component included cooking demonstrations, discussions about cooking on a budget and involvement in community vegetable gardens.	Location(s)	Waminda, Nowra, NSW	Firth et al. (2012) Case study using cyclical action research	Location(s)	Waminda Community Controlled Service	• GEM used at commencement and 3 month intervals to monitor social emotional health and wellbeing. Outcomes were not reported • Facilitators reported improvements in the participant's confidence, self-esteem and general wellbeing • Participants reported enjoying social connection, having a laugh, improved energy, and motivation
	Participants	Indigenous and non-Indigenous women of Waminda community		Participants	51 Indigenous and 3 non-Indigenous women	
	Duration	Commenced 2010		Duration	Unclear	
	Indigenous specific	No		Indigenous specific	No	

(continued)

Table B1 (continued): Methods and description of programs and their associated evaluations

Program	Program details		Evaluation[a]	Evaluation details		Evaluation outcomes
Work It Out Holistic 12-week chronic disease self-management program including 2 2-hour sessions, 1-hour 'yarn', and 1-hour exercise per week. 'Yarn' sessions led by occupational therapist, psychologist, exercise physiologist, and dietitian. There were opportunities to meet with session leaders individually for support.	Location(s)	Urban South-East Qld	Nelson et al. (2016) Mills et al. (2017) Hu et al. (2019) Mixed-methods retrospective observational study	Location(s)	Community-controlled health organisation	• More likely to use GP mental health consultations (OR: 1.7, 95%CI: 1.2–2.5) • More likely to use dietetic services (OR: 2.9, 95%CI: 2.2–3.9) • Qualitative findings: improved emotional wellbeing, social connectedness, confidence, and enjoyment in life • Improvements in physical activity parameters
	Participants	Indigenous Australians with 1 or more cardiovascular diseases		Participants	28 (2016) 85 (2017) 294 (2019)	
	Duration	12 weeks		Duration	12 weeks	
	Indigenous specific	Yes		Indigenous specific	Yes	
Aunty Jean's Good Health Team Group-based intervention including day-long weekly sessions. Sessions with non-Indigenous dietitian, exercise physiologists, diabetes, and cardiac rehabilitation workers. Two nutrition topics are included: 'Talking Tucker' information session and 'In the Kitchen' cooking demonstration.	Location(s)	Illawarra, NSW	Curtis et al. (2004) Browne et al. (2016) Participatory evaluation of pilot program	Location(s)	Aboriginal Community Centre	• Very well accepted by community • 'Considerable improvement' in function, overall health and self-management • 'Modest improvement' in quality of life (family and social support) • 'Significant improvement' in daily activities, feelings and social activities, pain, fitness, overall health and change in health
	Participants	Indigenous Australians with a chronic disease		Participants	15 Elders (men and women)	
	Duration	12 weeks		Duration	12 weeks	
	Indigenous specific	Yes		Indigenous specific	Yes	

Table B1 (continued): Methods and description of programs and their associated evaluations

Program	Program details		Evaluation[a]	Evaluation details		Evaluation outcomes
Deadly Choices Group-based sessions including a 90-minute session per week delivered by young Indigenous healthy lifestyle workers who were considered role models in the community. Encouraged healthy choices, focusing on chronic diseases and their risk factors including nutrition, physical activity, smoking and harmful substances.	Location(s)	South-East Qld	Malseed (2013) Mixed methods evaluation	Location(s)	Schools and Communities in South-East Qld	• Significant increase in nutrition and health knowledge • Improved attitudes, self-efficacy and behaviours • Many changes were sustained at 4 to 6 months • Improved leadership ability and confidence to make 'deadly choices' (that is, healthy choices) • Significant increase in physical activity frequency per week • Feedback was to include a mental health component
	Participants	School children		Participants	103; 68% male Mean age 14.8 years	
	Duration	7 weeks		Duration	7 weeks	
	Indigenous specific	No		Indigenous specific	No, 86% Indigenous Australians	
EON Thriving Communities Program Community and school groups delivered by EON Project Managers fortnightly. Components included: education about healthy lifestyle choices, nutrition, food hygiene and the value of each in preventing disease and maintaining good health practical hands-on food preparation, cooking workshops in garden-based 'bush kitchens', school kitchens and other community spaces increase participants' fruit and vegetable consumption.	Location(s)	24 communities in WA and NT	EON Foundation Inc (2017) Mixed methods evaluation	Location(s)	WA	• 75% of students scored 85% or higher when asked to identify food and drink options as being healthy or unhealthy • 71% knew a recipe for a healthy meal that uses fruit and vegetables • 91% believe it is important to eat fruit and vegetables • 92% would like to eat more fruit and vegetables • Students reported feeling calm in the garden, enjoying cooking fruit and vegetables to make them feel 'brainy', happy healthy and have more energy • 96% of teachers reported positive changes in the attitudes and behaviours of students • 57% of teachers reported greater school attendance
	Participants	Primary and high school students		Participants	321 students 40 program stakeholders	
	Duration	3–5 years		Duration	-	
	Indigenous specific	Yes		Indigenous specific	Yes	

(continued)

Table B1 (continued): Methods and description of programs and their associated evaluations

Program	Program details		Evaluation[a]	Evaluation details		Evaluation outcomes
Girls Academy Group Sessions and mentoring by at least 2 accomplished Indigenous Australian women from the local community. Program components included: • wellbeing (relationships, self-esteem, resilience, mental health) • cultural knowledge and understanding (includes nutrition and traditional cook-ups) • community engagement and leadership • future pathways and careers.	Location(s)	NSW, Qld, WA, NT	Girls Academy (2020) Mixed methods process evaluation	Location(s)	42 schools	• Stronger sense of social connectedness • 19.4% increase in Year 12 graduation rates from 2016 to 2017 • 80% of 2017 Year 12 graduates went onto further education, training or employment • Better educational outcomes were reported to improve quality of life (qualitative assessment)
	Participants	School-aged girls		Participants	2,600	
	Duration	2004 to ongoing		Duration	School years	
	Indigenous specific	Yes		Indigenous specific	Yes	
Healthy Eating and Active Living Indigenous Groups (HEALInG) Weekly group-based sessions provided by a qualified health professional (unspecified). Sessions included: 1 hour exercise 0.5 hour lunch 1.5 hour learning session. Lunch, transport and childcare were provided. Topics were physical activity, preventing lifestyle diseases, understanding self-esteem. Five sessions targeted healthy eating principles.	Location(s)	Northern NSW	NSW Health Department (2004, 2019) North Coast Area Health Service (2005) Explorative and formative qualitative evaluation	Location(s)	Northern NSW LHD	• Increased nutrition knowledge, physical activity levels and goal-setting behaviours • Improved self-esteem • Barriers to maintaining changes were financial difficulties, insecure housing, unstable relationships and personal issues • Enablers: providing lunches to try new foods, focus on delivery to older women
	Participants	>100 Indigenous Australians		Participants	11 women	
	Duration	10 weeks 2003–2010		Duration	2003–04	
	Indigenous specific	Yes		Indigenous specific	Yes	

Table B1 (continued): Methods and description of programs and their associated evaluations

Program	Program details		Evaluation[a]	Evaluation details		Evaluation outcomes
Jamie's Ministry of Food Aimed to provide an engaging community-focused program teaching basic cooking skills, nutrition knowledge, and improved self-efficacy and social connectedness. Involved weekly 90-minute cooking class for 5 weeks (Mossman Gorge, Cherbourg) and 10 weeks (Ipswich).	Location(s)	Mossman Gorge Cherbourg Ipswich	Flego et al. (2014) The Good Foundation (2016) Jamie's Ministry of Food Australia (2015, 2016) Two case studies: (Mossman Gorge, Cherbourg) and mixedmethods longitudinal controlled intervention study (Ipswich)	Location(s)	Mossman Gorge Cherbourg Ipswich	Mossman Gorge: • 43% completed • Most participants would recommend the program • 95% had increased importance of health eating improved social connectedness and empowerment Cherbourg • Increased vegetable intake • Reduced takeaway food • Increased confidence with cooking meals • Outcomes sustained for 6 months • 'It lifts me to socialise with younger people' (Elder) Ipswich Intervention group: • Increased fruit, vegetables • Increased home cooking • Increased use of salad/ vegetables in meals • Improved social connectedness, self-esteem • Brought families together • Increase in general health • Changes were sustained at 6 months post-intervention • No change in BMI
	Participants	12 years – elderly		Participants	*Mossman Gorge* 173 participants 69% female *Cherbourg* 186 participants 48% aged 12–29 *Ipswich* 931 participants (694 intervention, 237 control) 77% females, 55% <50 years of age	
	Duration	5–10 weeks		Duration	5–10 weeks	
	Indigenous specific	No		Indigenous specific	No 64% Indigenous Australians (Mossman Gorge) 12 Indigenous Australians (Ipswich)	

(continued)

Table B1 (continued): Methods and description of programs and their associated evaluations

Program	Program details		Evaluation[a]	Evaluation details		Evaluation outcomes
My Health for Life Six group health coaching or individual telephone health coaching by a trained allied health practitioner. Key topics: living and coping well, eating healthier, enjoying physical activity, smoking, alcohol, and healthy weight. Queensland Aboriginal and Islander Health Council (QAIHC) represented Aboriginal Medical Services throughout Queensland and provided guidance to ensure the program was suitable for Indigenous communities.	Location(s)	Qld	Queensland Government (2016) Continuous longitudinal evaluation	Location(s)	>11 health services	• Mental health and nutrition (fruit, vegetable, sugary drink, takeaway, alcohol, and nutrition knowledge) are evaluated at 3 times • Outcomes not yet publicly available
	Participants	~10,000 adults		Participants	~10,000 adults	
	Duration	6-month intervention Ongoing from 2016		Duration	6 months	
	Indigenous specific	Adapted to be suitable for Indigenous Australians		Indigenous specific	Adapted to Indigenous Australians	
Tucka-time Learning program about healthy eating choices on a budget, goal setting, self-esteem, resilience and decision-making. Facilitated by trained local Aboriginal Medical Service workers with a nutritionist or dietitian. Included information sessions, supermarket tours and cooking sessions.	Location(s)	Schools in Qld	CheckUP Informal process evaluation. Formal evaluation ongoing (unpublished)	Location(s)	6 schools in regional, rural and remote Qld	• Mental health outcomes not yet published (program finished June 2020) • Informal feedback from teacher: improved class behaviour • Informal feedback (survey) from students: increased nutrition knowledge, improved confidence, and improved willingness to help prepare and cook at home with their families
	Participants	School aged		Participants	6 schools, 30 participants per school	
	Duration	2017–2020 (ongoing)		Duration	10-week intervention	
	Indigenous specific	Yes		Indigenous specific	Yes	

Table B1 (continued): Methods and description of programs and their associated evaluations

Program	Program details		Evaluation[a]	Evaluation details		Evaluation outcomes
Belcourt Youth Activities Program/National Youth Sports Program (BYAP/NYSP) Summer group education prevention program Components include exercise, suicide prevention, tobacco prevention, drug and alcohol prevention and career outlook. Includes a nutrition guide for healthy food.	Location(s)	Chippewa, North Dakota, USA	Martin (2015) Single-arm post-test intervention study	Location(s)	Turtle Mountain, Chippewa	• 58% reported improved morale either multiple times per week or daily due to the program
	Participants	Tribal members		Participants	52 participants Aged 7–17 years Participants can re-enrol numerous times	
	Duration	5 days per week for 4 weeks		Duration	5 days per week for 4 weeks	
	Indigenous specific	Yes (American Indian)		Indigenous specific	Yes (American Indian)	
Healthy Children, Strong Families (HCSF) *Trial 1:* Family homes in 4 tribal communities Intervention: received mentored Control: mailed healthy lifestyle toolkit. *Trial 2:* Intervention: Wellness Journey healthy lifestyle toolkit with social support Control: Safety Journey child safety toolkit.	Location(s)	Wisconsin, USA	Tomayko et al. (2016, 2019) 2 randomised controlled trials	Location(s)	Tribal communities in Wisconsin, USA	Trial 1: • Well received by community • No between group differences • Mental health score significantly improved in both groups • Children with obesity reduced BMI in years 1 and maintained in year 2 ($p < 0.05$) • No change in adult BMI • Child fruit and vegetable intake increased but adults did not • Both adults & children decreased television watching Trial 2: • No change in mental health • Improvements in adult fruit and vegetable intake • Improved home nutrition environment, child dietary pattern, and moderate-to-vigorous physical activity • No change in BMI, screen time or child physical activity
	Participants	People from American Indian communities		Participants	Trial 1: 150 participants, adults and children (2–5 years) Trial 2: 450 participants, adults (primary caregiver) and children	
	Duration	12 months		Duration	12 months	
	Indigenous specific	Yes (American Indian)		Indigenous specific	Yes (American Indian)	

(continued)

Table B1 (continued): Methods and description of programs and their associated evaluations

Program	Program details		Evaluation[a]	Evaluation details		Evaluation outcomes
Kahnawake School Diabetes Prevention Program (KSDPP) Community/ culturally-based diabetes prevention program Includes 5 programs. Two relevant programs are: Healthy Mind in a Healthy Body: a series of lectures on nutrition and health eating, traditional foods, and other lifestyle components Haudenosaunee Food Cooking Workshops: cooking skills general and traditional	Location(s)	Kahnawake, Mohawk territory, Canada	Murdoch-Flowers et al. (2019) Single-arm post-test qualitative study	Location(s)	Kahnawake, Mohawk territory, Canada	• Improvements in holistic concepts of health and wellbeing (mental, physical, spiritual and social dimensions) • Specific themes regarding the 2 interventions in focus: – 'Value healthy eating and cooking' – 'Feelings of connection with ancestors, history and culture' – 'Sense of culture and social identity' – 'Positive feeling, happiness' – 'Fulfilment of spiritual needs'
	Participants	Indigenous peoples in Canada		Participants	1 key informant and 17 adult females	
	Duration	Intermittent, a few weeks		Duration	Intermittent, a few weeks	
	Indigenous specific	Yes (Indigenous peoples in Canada)		Indigenous specific	Yes (Indigenous peoples in Canada)	
Together on Diabetes Individualised health intervention	Location(s)	South-Western USA	Kenney (et al. 2016)	Location(s)	South-Western USA	• 85% retention at 12 months • Improved quality of life, $p < 0.001$ for all components of the Paediatric Quality of Life tool • Decreased BMI ($p = 0.004$), HbA1c ($p = 0.036$), percentage of people with hypertension ($p = 0.026$) • Decrease in fruit ($p = 0.001$) and grain consumption ($p < 0.001$) at 12 months No change in vegetables, or fat or sweets as a percentage of kilocalorie intake
	Participants	American Indian youth at high risk for diabetes		Participants	256 youth 225 support persons	
	Duration	12 months (6-month intervention, 6-month maintenance)		Duration	12 months	
	Indigenous specific	Yes (American Indian)		Indigenous specific	Yes (American Indian)	

Table B1 (continued): Methods and description of programs and their associated evaluations

Program	Program details		Evaluation[a]	Evaluation details		Evaluation outcomes
Twelve 45–60-minute lesson, twice weekly for 6 months, then 20 minute monthly maintenance sessions. Sessions included nutrition, physical activity life skills with accompanying goal setting. Developed and implemented in partnership with tribal communities. Included a support person (18 years or older) partnered participant.	Focus Location(s)	Healthy lifestyle Salt Lake, USA	Single-arm pre- and post-test intervention study	Focus	Program retention Quality of life BMI HbA1c Hypertension Nutrition	
Wellness coaching program Women from the respective communities were trained as community wellness coaches to focus on obesity and depression. High- versus low-intensity motivation interviewing based health coaching. The program had a weight-inclusive approach and focused on fruit and vegetable intake.	Participants	American Indian/ Alaskan Native, Pacific Islander, Hispanic/Latino, African American and African immigrant	Sunada (2018) Randomised controlled trial Participants	Location(s)	Salt Lake, USA	• Depression prevalence decreased (21.7% to 9.5%) • Consuming fruit/vegetables at least 5 times per day had improved depression screen compared to those who were not • Women with a negative depression screen had higher odds of a ≥5% decrease in waist circumference
				485 participants	100% female	
	Duration	12 months		Duration	12 months	
	Indigenous specific	No		Indigenous specific	No	

(continued)

Appendix C: Methods

An integrative systematic review brought together peer-reviewed literature and grey-literature publications to provide a sound understanding of the current state of evidence for the role of nutrition in supporting the mental health of, and reducing suicide in, Aboriginal and Torres Strait Islander people.

Study design

The review applied the empirical integrative review method as described by Whittemore & Knafl (2005) and Soares et al. (2014). An integrative review is a comprehensive research method that uses empirical studies and programs with different methodological approaches to synthesise research on a determined issue. This method can generate new approaches and perspectives on an issue (Soares et al. 2014). The steps that will be applied are outlined in this Appendix.

Systematic search strategy

The systematic search strategy was designed around the participant, intervention, comparator, outcome (PICO) elements of the research question (Table C.1).

Table C.1: PICO elements (Inclusion Criteria)

Element	Criteria
Participant	Aboriginal and Torres Strait Islander people Other Aboriginal peoples of Oceania, Canada and the United States of America Culturally and Linguistically Diverse people (as defined by AIHW) in Australia No restriction on participant age or other demographic details.
Intervention	Observational dietary studies and upstream and downstream dietary and nutritional interventions, including but not limited to: Diet intake, pattern or quality; food accessibility; mealtime environment; family participation in food preparation; social events surrounding food and meals; use of traditional foods and cooking methods.
Comparator	No restriction placed on comparator status of systematic reviews, intervention or observational articles. All forms of comparator groups and studies without a comparator group will be included.
Outcome	Mental health status (social isolation, depression, anxiety, mood, quality of life, cognitive function, delusions), risk taking or suicidal behaviour (recreational drug use, illegal activities, school truancy, suicide attempts or rates) as a primary or secondary outcome. Changes in physical health alongside changes to mental health will be explored as an explanatory variable.
Sources	Systematic reviews or narrative reviews of observational or interventional studies. Individual intervention studies, observational studies, qualitative studies, dissertations, conference abstracts, unpublished program evaluations and unpublished interviews of any design.

The literature search did not apply date restrictions. The search included the following:

1. Peer-reviewed literature: electronic databases CINAHL, PubMed, PsychINFO, Cochrane Library, EMBASE were searched on 13 March 2020. The complete search strategy and PRISMA flow chart are reported below.
2. Grey literature: Google, Indigenous Australia HealthInfoNet, Informit, Closing the gap Clearinghouse, Centre of Best Practice in Aboriginal and Torres Strait Islander Suicide Prevention (CBPATSISP), Centre for Aboriginal Economic Policy Research (CAEPR), and Proquest were searched from 28th March to the 3rd April 2020. The complete search strategy and PRISMA flow chart are reported below.

Exclusion criteria

The following were excluded:

1. nutrition interventions with physical health outcomes without a mental health outcome
2. food insecurity studies without both a nutrition component and mental health or suicide outcome
3. lifestyle interventions without a core nutrition component (e.g. providing nutrition information sheets or a single nutrition session).

Comment on the population group

Indigenous Australians were the primary target populations. Other Indigenous peoples of Oceania (Polynesia, Melanesia, Micronesia, Papua), Indigenous people of Canada (Indian/First Nations, Inuit and Métis), and Indigenous peoples of the United States of America (Native Americans and Alaskan Natives) formed secondary target groups.

Comment on the interventions

It is common for nutrition interventions to be coupled with other lifestyle components (particularly physical activity). In these instances, studies were included where there is a core nutrition intervention within the greater lifestyle intervention. Examination of the nutrition component was the core focus. The difficulty in separating the nutrition component on outcomes was discussed.

Food accessibility and food-security studies were included only where there were clear outcomes for both nutrition intake and mental health. Food-security status was considered a nutrition outcome.

Screening and data extraction of scientific journal articles

Article identification occurred over 2 phases:

- Phase I—titles and abstracts (for peer-reviewed publications) and websites (for grey literature) were screened by one reviewer.
- Phase II—full texts of articles or reports included from Phase I were examined for inclusion by the same reviewer.

Data were extracted using a standardised table developed for this review and included: study and program design, population demographics, setting, program elements, outcomes and outcome assessment methods, and limitations.

Study quality

Identified sources were rated for:

- methodological rigour using the Academy of Nutrition and Dietetics Quality Criteria Checklist for either original research or qualitative studies. They were rated independently by 2 reviewers (discrepancies were resolved by a third reviewer) (Academy of Nutrition & Dietetics 2012).
- the quality of grey literature was assessed by the AACODS (Authority, Accuracy, Coverage, Objectivity, Date, Significance) Checklist and rated independently by 2 reviewers (discrepancies were resolved by a third reviewer) (Tyndall 2010).

Data synthesis

Data describing the interventions were extracted for qualitative synthesis. Meta-analysis could not be performed as data were not reported using validated mental health assessment tools.

To identify barriers to, and facilitators of, effective nutrition interventions in Indigenous Australians, qualitative data were analysed and synthesised using the method of constant comparison. This converts extracted data into systematic categories, facilitating the identification of patterns, themes, variations and relationships. A logic model framework for community nutrition education (Medeiros 2005) facilitated the exposure of strategies and themes from each of the included programs. As themes emerged from the data, they were collated.

Search strategy and PRISMA flowchart for systematic literature review of scientific databases

Table C.2: Search strategy based on participant, intervention, comparator, and outcome (PICO) elements

PICO element	Key terms	Search items
Participant	Aboriginal and Torres Strait Islander people Other Aboriginal peoples of Oceania, Aboriginal peoples of Canada, Aboriginal peoples of the United States of America People from Culturally and Linguistically Diverse (CALD) backgrounds	(australia* OR "northern territory" OR Tasmania OR "new south wales" OR victoria OR queensland OR "Australian capital territory") AND (Aborigin* OR "Torres Strait" OR ATSI OR indigen* OR native OR "first australians" OR "first Australian" OR "oceanic ancestry") Second round: (alaska OR "alaska native" OR "american indian" OR autochthonous OR eskimo OR "Ethnic Group" OR "first nation" OR Greenlandic OR indigenous OR inuit OR Inupiat OR inuvialuit OR kalaallit OR maori OR "tangata whenua" OR maoris OR mapuche OR "native American" OR "native people" OR "native population" OR "native Siberian" OR navaho OR nunangat OR tribe OR tribal OR yuit OR yupik OR zuni OR Samoan OR Native Hawaiian) Third round: ("Visible minority" OR "Visual minority" OR "Culturally and Linguistically Diverse" OR "Non-White" OR "ethnic minority" OR "racial minority" OR "linguistic minority" OR "language minority" OR "English as Second Language" OR "Language other than English" OR "Language Background other than English" OR "English as an Additional Language or Dialect" OR CALD or "culturally and linguistically diverse" OR sami OR skolt)
Intervention	Upstream and downstream dietary and nutritional interventions, including but not limited to: Diet intake, pattern, or quality; mealtime environment; family participation in food preparation; social events surrounding food and meals; use of traditional foods and cooking methods. * core food accessibility	(Diet* OR nutri* OR "food accessibility" OR meal OR "food preparation" OR "dietary habits" OR "food habits" OR "food intake" OR "eating patterns" OR "food environment" OR "Food availability" OR cooking OR food* or vegan or vege* or meat or carbohy* or fibre or sugar* or vitamin* or fruit*)
Comparator	No restriction on comparator status	Not applicable
Outcome	Mental health status (social isolation, depression, anxiety, mood, quality of life, cognitive function, delusions), risk taking or suicidal behaviour (recreational drug use, illegal activities, school truancy, suicide attempts or rates). Changes in physical health alongside changes to mental health will be explored as an explanatory variable	(Mental health or "social isolation" OR stress OR psychological well-being or psychological outcomes or mental well-being or psychiat* or mental illness* or mental disorder* or depress* or mood disorder* or affective disorder* or anxi* or panic or obsessive compulsive or OCD or adhd or attention deficit or attentional deficit or phobi* or bipolar type or bipolar disorder* or psychosis or psychotic or schizophr* or schizoaffective or antipsychotic* or post traumatic* or personality disorder* or stress disorder* or dissociative disorder or antidepress* or antipsychotic* OR QOL OR "quality of life" OR cognit* OR delusion OR (substance OR drug OR alcohol OR tobacco OR petrol OR cannabis OR methamphetamine OR MDMA OR inhalant OR marijuana OR amphetamine OR "psycho stimulant" OR smok* OR "illicit drug" OR "volatile drug" OR truancy)

Table C.2: Search strategy based on participant, intervention, comparator, and outcome (PICO) elements

PICO element	Key terms	Search items
Sources	Systematic reviews or intervention studies of any design, observational studies, qualitative studies, unpublished program evaluations, unpublished interviews	Not applicable

Final search strategy

(aborigin* OR “torres strait” OR ATSI OR indigen* OR native OR “first australians” OR “first Australian” OR “oceanic ancestry” OR alaska OR “alaska native” OR “american indian” OR autochthonous OR eskimo OR “Ethnic Group” OR “first nation” OR Greenlandic OR indigenous OR inuit OR Inupiat OR inuvialuit OR kalaallit OR maori OR “tangata whenua” OR maoris OR mapuche OR “native American” OR “native people” OR “native population” OR “native Siberian” OR navaho OR nunangat OR tribe OR tribal OR yuit OR yupik OR zuni OR Samoan OR Native Hawaiian OR “Visible minority” OR “Visual minority” OR “Culturally and Linguistically Diverse” OR “Non-White” OR “ethnic minority” OR “racial minority” OR “linguistic minority” OR “language minority” OR “English as Second Language” OR “Language other than English” OR “Language Background other than English” OR “English as an Additional Language or Dialect” OR CALD or “culturally and linguistically diverse” OR sami OR skolt)

AND

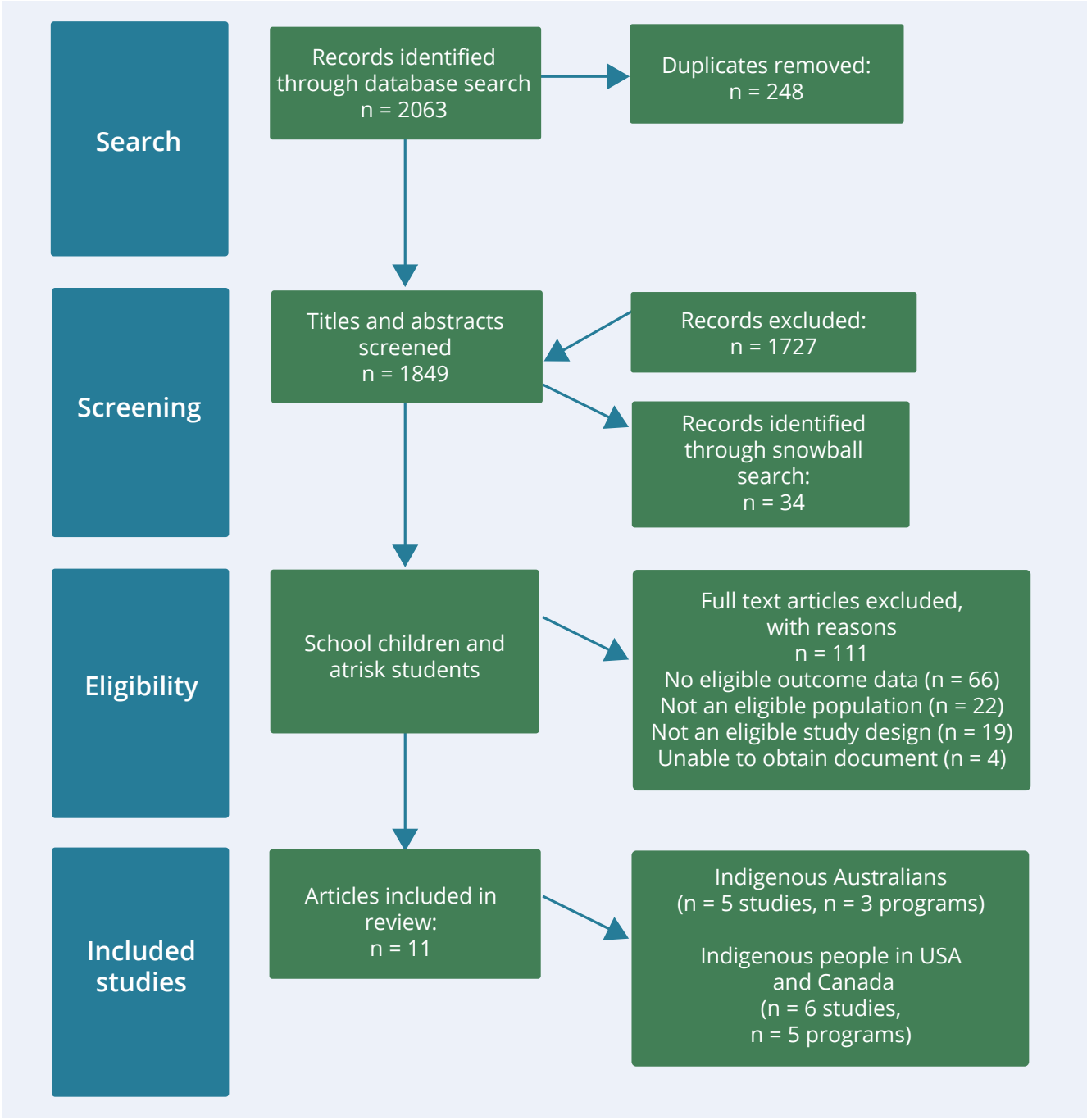
(Diet* OR nutri* OR “food accessibility” OR meal OR “food preparation” OR “dietary habits” OR “food habits” OR “food intake” OR “eating patterns” OR

“food environment” OR “Food availability” OR cooking OR food* OR vegan OR vege* OR meat or carbohy* OR fibre OR sugar* OR vitamin* OR fruit*)

AND

(Mental health or “social isolation” OR stress OR psychological well-being or psychological outcomes or mental well-being or psychiat* or mental illness* or mental disorder* or depress* OR “mood disorder*” OR “affective disorder*” OR anxi* OR panic OR “obsessive compulsive” OR OCD OR adhd OR “attention deficit” OR “attentional deficit” OR phobi* OR “bipolar type” OR bipolar disorder* OR psychosis OR psychotic OR schizophr* OR schizoaffective OR antipsychotic* OR post traumatic* OR personality disorder* OR stress disorder* OR dissociative disorder OR antidepress* OR antipsychotic* OR QOL OR “quality of life” OR cognit* OR delusion OR alcohol OR tobacco OR petrol OR cannabis OR methamphetamine OR MDMA OR inhalant OR marijuana OR amphetamine OR “psycho stimulant” OR smok* OR “illicit drug” OR “volatile drug” OR “substance use OR “substance abuse” OR “drug use” OR “drug abuse” OR truancy)

Figure C.1: PRISMA flowchart for systematic peer-reviewed literature review



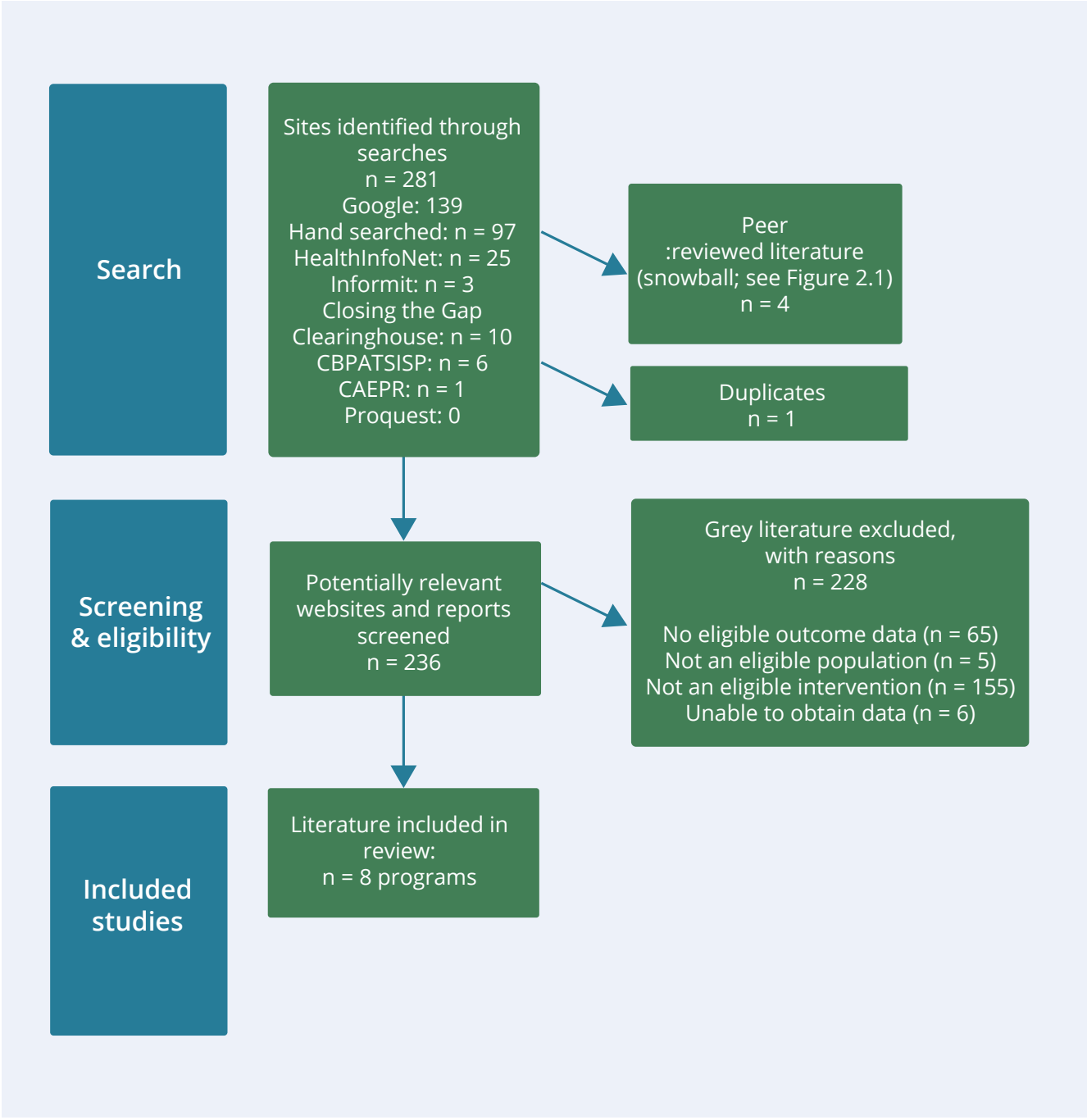
Search strategy and PRISMA flowchart for grey literature

Table C.3: Database and search terms for grey literature

Database and search terms	# results	# screened
Google **Date of search: 28/03/2020** **No filters**		
aboriginal OR torres strait AND australia AND mental AND nutrition AND program OR initiative aboriginal AND australia AND cook* AND "quality of life" AND program OR initiative	~1,390,000 ~1,080,000	100 (10 pages) 30 (3 pages) – not relevant
tucker "mental health" initiative indigenous australia	~241,000	100 (10 pages)
indigenous australia AND diet AND depression AND program	~5,160,000	50 (5 pages)
malnutrition mental health aboriginal australia	~2,690,000	50 (5 pages)
Indigenous Australian Health InfoNet **Date of search: 31/03/2020** **Filter: programs, title & description**		
nutrition mental diet suicide	720 169	90 (3 pages) 90 (3 pages)
Informit **Date of search: 03/04/2020** **No filters**		
(indigenous OR aboriginal) AND (nutritio* OR diet OR cook*) AND (mental* OR emotion* OR xxvuicide* OR depress* OR psych* OR wellbeing OR "quality of life")	216	216
nutrition program indigenous	51	51
Closing the Gap Clearinghouse **Date of search: 03/04/2020**		
All publication titles manually screened	40	40
Centre of Best Practice in Aboriginal and Torres Strait Islander Suicide Prevention (CBPATSISP) **Date of search: 03/04/2020**		
All publication titles manually screened	15	15
Centre for Aboriginal Economic Policy Research (CAEPR) **Date of search: 03/04/2020**		
All publication titles searched for key words (food, eat, cook, health, mental, nutrition, diet, cog, psych, mood, quality of life, emotion, wellbeing, wellbeing)	NA	NA
Proquest **Date of search: 03/04/2020**		
Publication titles searched for key words (Aboriginal, indigenous, food, eat, cook, health, mental, nutrition, diet, cog, psych, mood, quality of life, emotion, wellbeing, well-being-being)	Not productive	NA

NA, not applicable

Figure C.2: PRISMA flowchart for systematic peer-reviewed literature review



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Abbreviations

AACODS	Authority, Accuracy, Coverage, Objectivity, Date, Significance
ABS	Australian Bureau of Statistics
AIHW	Australian Institute of Health and Welfare
BMI	body mass index
CAEPR	Centre for Aboriginal Economic Policy Research
CALD	Culturally and Linguistically Diverse
CBPATSISP	Centre of Best Practice in Aboriginal and Torres Strait Islander Suicide Prevention
CI	confidence interval
GEM	Growth and Empowerment Measure
GP	General Practitioner
HEALInG	Healthy Eating and Active Living Indigenous Groups
KSDPP	Kahnawake School Diabetes Prevention Program
NSW	New South Wales
NT	Northern Territory
PICO	Participant, intervention, comparator, outcome
QAIHC	Queensland Aboriginal and Islander Health Council
QQC	Quality Criteria Checklist
Qld	Queensland
SA	South Australia
SEARCH	Study of Environment on Aboriginal Resilience and Child Health
SEWB	Social Emotional Wellbeing
USA	United States of America
WA	Western Australia
WHO	World Health Organization

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There is growing evidence that diet quality and adequate nutrition could improve mental health. Many factors influence the diets of Aboriginal and Torres Strait Islander people; for example, colonisation's disruption to traditional dietary patterns and food sourcing, and the entrenchment of socio-economic disadvantage. As a population group, Indigenous Australians are consuming a diet of low nutritional quality. This publication reviews the nutrition-focused programs that were delivered to Indigenous Australian communities, which also measured emotional wellbeing and mental health outcomes.

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Stronger evidence,
better decisions,
improved health and welfare