
Drivers of food cost in outer regional, remote, and very remote Australia: a systematic scoping review

Received: 10 October 2025

Accepted: 6 March 2026

Published online: 17 March 2026

Cite this article as: van Burgel E., Martin C., Dancey J. *et al.* Drivers of food cost in outer regional, remote, and very remote Australia: a systematic scoping review. *BMC Public Health* (2026). <https://doi.org/10.1186/s12889-026-26968-3>

Emma van Burgel, Chloe Martin, Jane Dancey, Beau Cubillo, Francis Nona, Eddie Miles, Megan Ferguson, Georgia Day & Julie Brimblecombe

We are providing an unedited version of this manuscript to give early access to its findings. Before final publication, the manuscript will undergo further editing. Please note there may be errors present which affect the content, and all legal disclaimers apply.

If this paper is publishing under a Transparent Peer Review model then Peer Review reports will publish with the final article.

ARTICLE IN PRESS

Drivers of food cost in outer regional, remote, and very remote Australia: A systematic scoping review

Emma van Burgel^a, Chloe Martin^a, Jane Dancey^a, Beau Cubillo^{a,b}, Francis Nona^d, Eddie Miles^e, Megan Ferguson^{a,b,c}, Georgia Day^{a,f}, Julie Brimblecombe^{a,b} (senior author)

Corresponding author: Emma van Burgel (emma.vanburgel@monash.edu)

Department of Nutrition Dietetics and Food Level 1 264 Ferntree Gully Rd Notting Hill
3168 Victoria Australia

Addresses and affiliations

^a**Department of Nutrition, Dietetics and Food, Monash University, Melbourne, VIC, Australia** (E van Burgel, C Martin, J Dancey, C Cubillo, M Ferguson, G Day, J Brimblecombe);

^b**Menzies School of Health Research, Royal Darwin Hospital Campus, Darwin, NT, Australia** (B Cubillo, M Ferguson, J Brimblecombe); ^c**School of Public Health, The University of Queensland, QLD, Australia** (M Ferguson); ^d**School of Medicine, Queensland University of Technology, Brisbane, QLD, Australia** (F Nona); ^e**Community First Development, Mawson, ACT, Australia** (E Miles); ^f**Community Enterprise Queensland, Bungalow, QLD, Australia** (G Day).

Abstract**Background**

A key determinant of diet quality in outer regional to very remote areas is the higher cost of food. This systematic scoping review aims to identify evidence gaps on drivers of the cost of food, to guide future research and policy development to improve food security across outer regional to very remote areas of Australia.

Methods The Joanna Briggs Institute three step literature search was utilised and the review was conducted in accordance with PRISMA guidelines. Five electronic databases (Ovid MEDLINE, CINAHL, Informit, Embase, Scopus) were systematically searched in September 2024. Peer-reviewed literature set in outer regional to very remote regions of Australia were included if they were on the topic of food and food price and the drivers influencing these. Title and abstract screening were performed by two authors, as well as double screening of full texts by two authors. Data were extracted from included articles regarding remoteness category, aims, sampling, methodology, drivers influencing food price, outcomes and implications on policy, as well as author commentary on the drivers of food price. The CREATE tool for research involving Aboriginal and Torres Strait Islander communities was completed by two authors, with guidance from two First Nations authors and the senior author.

Results Twenty articles published between 1987 to 2022 met the inclusion criteria. Most studies reported on remoteness itself as the determinant of high food price. Other drivers of food price included freight, high operating costs of smaller stores and weather events.

Conclusions Those living in outer regional to very remote Australia pay more for food, however there is a lack of empirical detailed evidence on the drivers of higher food price. To effectively address the higher cost of food in outer regional, rural, and remote Australia and promote food security in these areas, empirical evidence on system determinants could complement existing expert evidence for targeted policy and government support.

Keywords

Remote, Regional, Australia, Food Cost, Food Price, Environmental Determinants, Food Access

Introduction

High food prices exacerbate sub-optimal nutrition and food insecurity.¹ The link between food insecurity, poor nutrition and the increasing prevalence of non-communicable diseases (NCDs) is well established.² An unhealthy diet is a leading contributor to the burden of preventable non-communicable disease globally.² Food security is internationally defined as the state “when all people have physical, social and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences”.³ In Australia, remote Aboriginal communities have said “food security for us is when the food of our ancestors is protected and always there for us and our children. It is [also] when we can easily access and afford the right nontraditional food for a collective healthy and active life. When we are food secure, we can provide, share and fulfil our responsibilities, we can choose good food knowing how to make choices and how to prepare and use it.”⁴ Multiple factors can influence food security and a person’s diet, from global to local factors, including food sovereignty and the governance of food systems, and the access, cost and marketing of food, in addition to a person’s time, cooking skills and access to housing and energy for food preparation. These are recognised in the principles of food sovereignty and the six dimensions of food security – availability, access, utilisation, stability, agency and sustainability.

In Australia, outer regional to very remote areas provide critical services to the rest of the country such as food production and protection of biodiversity, and yet have a moderate to very high restriction of accessibility to goods and services.⁵ Although only 10.1% of the total Australian population reside in these areas, Aboriginal and Torres Strait Islander peoples make up 30% of the population in remote and very remote areas of Australia, compared to 2.2% in metropolitan areas.⁶ Restricted accessibility

contributes to those living in regional to very remote areas having a disproportionate morbidity burden (233 disability adjusted life years [DALY] per 1000 people), compared to those living in major cities (174 DALY per 1000 people).⁷⁻¹¹ These inequities are associated with diet- and nutrition-related disease, with higher reported rates of chronic conditions such as diabetes, heart disease and obesity for outer regional to very remote regions compared to the rest of Australia, notably with Aboriginal and Torres Strait Islander peoples experiencing a diabetes burden six times as high as the rate of non-Indigenous Australians.^{12, 13}

A key determinant of diet quality in outer regional to very remote areas is the higher cost of food.¹⁴⁻¹⁶ Major supermarkets are concentrated in populous urban and inner regional Australia. In contrast, private- or community-owned stores provide for the majority of food supply needs of communities in outer regional, remote, and very remote Australia.^{17, 18} These smaller retailers provide an essential service for these regions of Australia, yet have limited buying power and contend with vast and isolated food supply routes.¹⁹ The higher cost of food provision within these small stores, compared to major supermarkets in urban areas, is therefore seen at the point of sale.²⁰

Higher food prices for those in rural and remote communities are of further concern for Aboriginal and Torres Strait Islander Peoples who already experience a health gap from non-Indigenous Australians.¹² Surveys on the cost of a basket of food in remote and very remote Aboriginal and Torres Strait Islander communities show that a basket of food can be up to 50% more expensive than in district centres, and in the Northern Territory (NT) this price differential was 40% in 2023.²¹⁻²³ This decreased affordability of food, can influence diet-related chronic disease in these communities, as food needs require a significant proportion of income.^{24, 25} In addition, discretionary food items high in salt, sugar and salt may be portrayed as more affordable options.²⁶

Drivers in the food system determine food price at point of sale. A food system combines all elements relating to food production through to food consumption, and the associated

socio-cultural, political, economic, demographic, infrastructural and environmental inputs or drivers.²⁶ These drivers, influence food supply chains, food environments (e.g., retail settings) and consumer behaviour, which in turn influence diet, nutrition and health (the system outputs).²⁶ The Australian Government has a responsibility to its citizens for access to food and water for a healthy life, with a newly released 2025-2035 National Strategy for Food Security in Remote Aboriginal and Torres Strait Islander Communities and plans to develop a national food security strategy.^{27, 28} Evidence on the drivers of food price in outer regional to very remote areas from a food system perspective can inform such government initiatives to address food affordability and food security across the country.

There is anecdotal evidence of drivers of increased cost of food across outer regional to very remote areas in Australia.²⁹⁻³¹ However, the peer-reviewed evidence is limited and lacks specificity on these drivers. This review aims to identify the gaps in the peer-reviewed evidence on the drivers of the cost of food and build on evidence to date to guide future research and relevant policy to improve food security across outer regional to very remote areas of Australia. The aim of this systematic scoping review is to examine the peer-reviewed literature to identify and investigate the drivers of the cost of food in outer regional to very remote Australian communities.

Methods

The Joanna Briggs Institute (2023) scoping review protocol was utilised to guide this review, and reported against the PRISMA 2020 checklist (Supplementary Material 1), based on the research question “What are the drivers of food cost in outer regional, remote, and very remote communities in Australia, and what impact do these factors have on food pricing?”.^{32, 33} A systematic scoping review was conducted due to the broad nature of the research question and to allow peer-reviewed research articles to be included irrespective of research quality.³⁴

Authorship team

The scoping review authorship team is comprised of six non-Indigenous and three Indigenous authors. The majority of authors have extensive knowledge and expertise in working with remote Aboriginal and Torres Strait Islander communities in food security and food affordability. CM undertook this review as part of the requirements for their Master of Dietetics at Monash University with JB as their supervisor.

Search Strategy

The three-step literature search recommended by the Joanna Briggs Institute was utilised.³⁵ The first stage involved a limited search of both MEDLINE and CINAHL where screening of words from title, abstract and article were completed (CM). The Population, Intervention, Comparison, Outcome (PICO) format was utilised (CM) to form keywords which were used to develop the search strategy.³⁶ Search terms for the intervention were not included in the final search strategy, as this significantly narrowed the search and could result in exclusion of articles if specific drivers of food cost were missed, and search terms for comparison were not applicable to the research question. The keywords identified were then used in the second stage (EvB). The search strategy was as follows – Population: (rural* OR remote OR region* AND Australia), intervention and comparison not applicable, outcome: (pric* OR cost* OR afford* OR expens* OR purchas* OR “food cost*” OR “food pric*” OR “food affordability” OR “food promotion” OR “diet cost”)(Supplementary Material 2). Searches were conducted on the following five electronic databases in September 2024: Ovid MEDLINE, CINAHL, Informit, Embase and Scopus, and limited to peer-reviewed literature. No date range filter was applied to the search. The third stage involved analysing the reference lists to ensure no relevant articles were missed.

Study Selection

All articles from the database searches were uploaded into the Covidence software (2024, Veritas Health Innovation, Melbourne, Australia), and duplicates were removed. Peer-reviewed articles that were focused on outer regional, remote or very remote areas, based on the Australian Statistical Geography Standard (ASGS) criteria⁷ or articles that compared these locations to urban settings were included if they were on the topic of economic access to food (i.e., food price, food affordability, food cost) and the drivers of

this, such as retail infrastructure, or the cost of procuring or transporting food (see Table 1). Articles were excluded if they were not peer-reviewed literature, if they were based in metropolitan, urban, peri-urban or inner regional areas without comparison to the geographical areas of interest, or if the focus was on a driver but did not relate back to economic access to food. Articles not in the English language were excluded due to resource restrictions. Title and abstract screening were completed by two authors (JD, EvB). Ten percent of title and abstract screening was completed by both authors, with a 99% agreement rate and conflicts resolved through discussion between both authors. The remaining title and abstract screening were completed by a single reviewer (EvB/JD). A double screen between two authors (EvB, JD) was completed for full text articles. Conflicts were discussed and resolved between authors or with the senior author (JB) to ensure a unanimous decision.

Table 1. Inclusion criteria

	Inclusion	Exclusion
Population/setting	Outer regional, remote or very remote Australia (based on ASGS criteria) or articles that compare these settings to urban settings	Based in metropolitan, urban, peri-urban or inner regional areas without no mention/comparison to outer regional, remote or very remote areas
Outcome	Topic of food, food price, food affordability, food cost Focused on drivers of food price (e.g., transport, distance, weather)	Focus on infrastructure, cost of utilities, health care access or disease demographics and does not relate back to determinants of economic food access and pricing Articles related to the price of alcohol, tobacco or other non-food goods (e.g., white goods) commonly sold in food retail stores.
Type of publication and study design	Full text available Peer reviewed articles	Full text not available

	Reports on primary data	Grey literature, Video and Sound, Book resource Conference abstracts, reviews, opinion pieces, abstract only available Does not report on primary data (e.g. narrative review)
Language	English language	All languages other than English
ASGS; Australian Statistical Geographic Standard		

Data Extraction

Data were extracted by two authors (EvB/JD) into a template created by CM, with guidance from senior author (JB). Summary tables were formed in Google Sheets to extract relevant data including ASGS remoteness category, aim of the study, sampling, methodology used for each study, drivers of food cost, as well as the associated outcomes such as percentage price differences between areas, and implications on policy. Commentary on the drivers of food price were extracted from the discussion of each article, to analyse repeated themes over the decades of research on the drivers of food price and with an aim to provide insight into authors' interpretations of the food system and drivers of economic access to food, adding another layer of evidence and giving some insight into the gaps in the current literature. In addition, commentary in the discussion of articles regarding implications of the research on policy and practice was extracted as reported in the articles, to collate the call to action arising from the decades of research, with the aim that this information may help guide future research in this area.

Data Synthesis

Data were synthesised in the data extraction sheets by two authors (EvB/JD). A description of the methods, study design, drivers, commentary, implications on public health, and limitations of the study, were summarised from what was reported in the study for ease of reporting. The remoteness category for each included article was altered to reflect ASGS remoteness criteria, and sampling type was summarised to

streamline analysis. After discussion with the authorship team regarding changes in ethical considerations across the date range of the review, the setting of the study was summarised into state/territory to ensure anonymity of communities reported on.

CREATE tool

For research that involves or impacts Aboriginal and Torres Strait Islander populations, it is best practice to apply the Centre for Research Excellence in Aboriginal Chronic Disease Knowledge Translation and Exchange (CREATE) or Consolidated criteria for strengthening the reporting of health research involving Indigenous Peoples (CONSIDER) tools to the research.^{37, 38} Within Indigenous research, the philosophical assumptions in which quality is understood may differ from Western-centred research; this is why it is important to consider Indigenous quality appraisals, as they provide an opportunity to critically reflect on how ethical principles of research that impacts on Indigenous peoples are considered and implemented within research. This includes reciprocity, respect, and responsibility of the research team to communities for mutual benefit, the survival and protection of Indigenous ways of knowing, being and doing and equality. In addition to the CREATE quality appraisal tool, three dimensions of the CONSIDER statement were included; participation and resource demands on communities, dissemination of research findings to governing bodies and peoples, and dissemination and knowledge translation and implementation to support Indigenous advancement.³⁷ With guidance from two Indigenous authors (BC/FN) and senior author (JB), two authors applied (EvB/JD) these tools to all articles that focused on Aboriginal and/or Torres Strait Islander communities.³⁸ The CREATE tool was published in 2020, and the CONSIDER statement, in 2019. The authors anticipated that not all studies in this review would meet these quality criteria, and note that applying these tools to past studies was challenging as the criteria included were not commonly reported previously. The quality of papers that impacted Aboriginal and Torres Strait Islander communities were however assessed in this regard, to respectfully contribute insights on how the criteria might be applied in research relating to the food supply.

Results

The database search yielded 9328 results after duplicates were removed, with 20 articles meeting the inclusion criteria and undergoing data extraction (Figure 1).

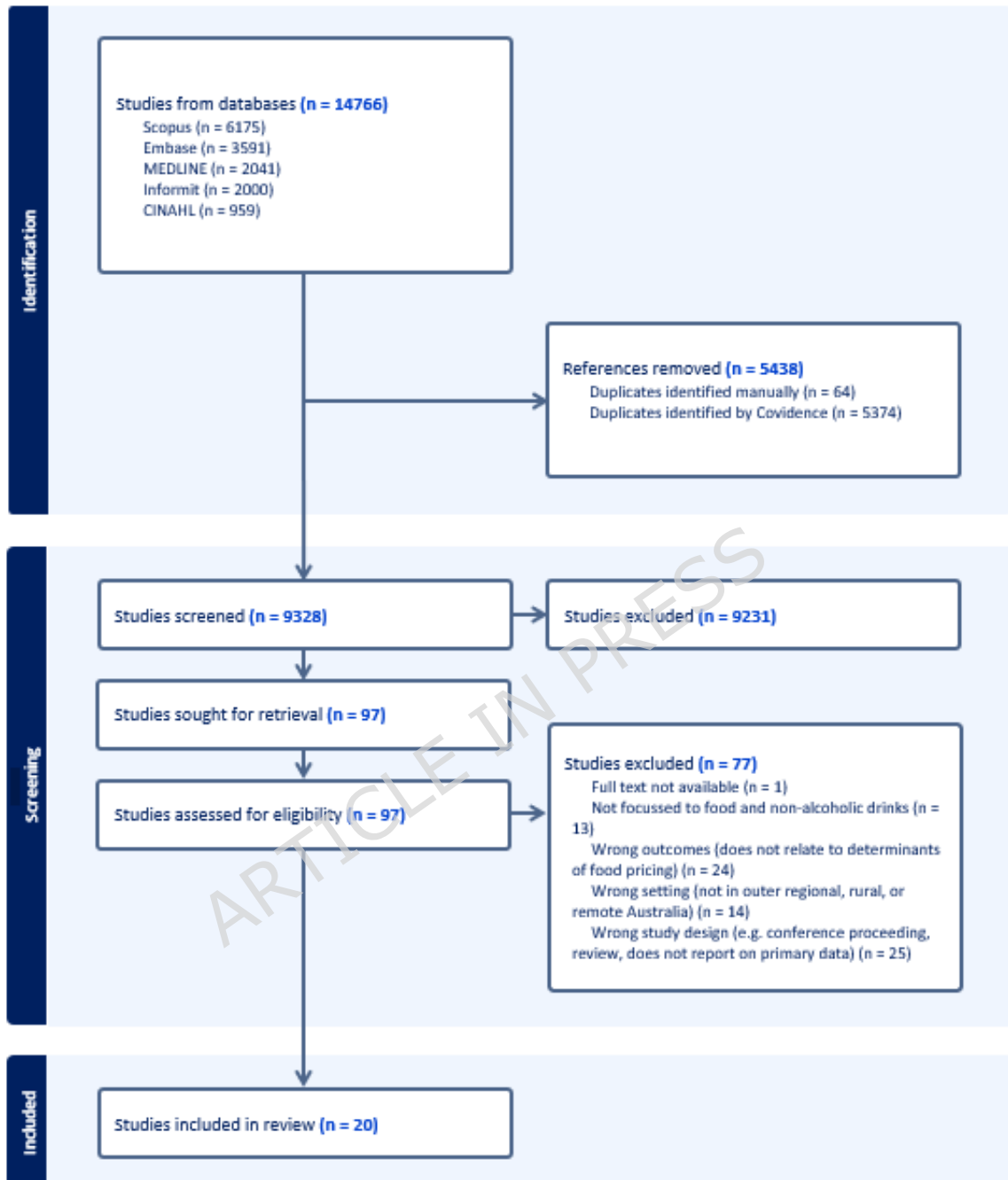


Figure 1: PRISMA flowchart of literature search and inclusion/exclusion process

Study Settings

Included articles (n=20) ranged from publication in 1987-2022. Most included articles were published from 2010 (n=14, 70%, Table 2). Six articles covered all five remoteness categories (30%). Remote areas were represented in eight studies (40%), with two

studies focusing solely on this ASGS category (10%). Seven studies (35%) included very remote settings, with three studies (15%) solely focused on the very remote category. Outer regional settings were represented in six studies (30%), with three studies (15%) including only outer regional areas (30%). The state of Queensland (Qld) was the setting for the most studies of any jurisdiction (n=6, 30%), followed by Western Australia (WA, n=5, 25%). Two studies were based in Victoria (VIC), and Northern Territory, New South Wales, and Tasmania were represented in one study each. Two studies included a mix of states or territories (NT, WA, South Australia (SA), Qld). Study populations included retail food stores ranging from major grocery retailers, to smaller independently run or community owned grocery stores in metropolitan, regional and remote locations of Australia (NT, Qld, SA, Tasmania, VIC and WA).

Study Designs and methods

Most articles reported using quantitative methods (n=15, 75%).^{15, 39-52} Four articles used qualitative methods (20%),⁵³⁻⁵⁶ and one used a mixed methods approach (5%, see Table 3).⁵⁷ Eight studies used purposive sampling (40%)^{15, 44, 46, 48, 49, 52, 54, 55}, with four studies utilising random sampling (20%)^{39, 42, 51, 57}, and four studies using convenience sampling (20%).^{41, 43, 45, 56} The majority of the included quantitative studies utilised a 'food basket' method (n=12, 60%), with a focus on the cost of a basket of food for a reference family.^{15, 39-43, 46-49, 51, 52} The majority of included qualitative studies used semi-structured interviews (n=3, 75%).⁵³⁻⁵⁵

Drivers of food price

Seventeen of the 20 studies determined remoteness as a factor affecting food price (80%, Table 3), with 12 studies solely mentioning remoteness as affecting food price (60%). Freight (n=3), operating costs (n=3), cross subsidisation (n=2) and type of store (privately owned versus chain/management group, n=2) were also mentioned as drivers, among others.

Demographic drivers of food price

Of the 17 studies (85%), ranging from 1987-2022, that reported food price to be influenced by remoteness, six were based in QLD (35%), followed by WA (n=3, 18%, Table 2,3). Studies reported the increased cost of food between major cities or regional centres and very remote areas, with the more remote the store, the higher the cost of food.^{39-52, 56} Of the quantitative studies reporting food price (n=15) to be associated with remoteness, nine studies (40%, 1987-2021) compared prices in outer regional to very remote areas, to their metropolitan counterparts (nearest capital city or highly accessible area) and found 30-160% higher food prices (average of 48.8%) in less accessible areas.^{39, 42, 45-50, 52} One study (2002) established that remoteness explained 58% of the variance in the price of a healthy food access basket across remoteness categories.⁴⁹ Some studies (2014) reported this cost disparity between remoteness categories in relation to food groups, particularly perishable foods (fruit, vegetables, and dairy).^{39, 41} A study in 2016 reported the cost differential to be even higher when comparing with the cost of generic products in metropolitan areas.⁴⁵

For those studies reporting geographical remoteness as a factor impacting food price, commentary given by authors as to what was driving this price differential included store operational costs (n=4, 24%, 1991-2021)^{42, 46, 48, 56}, store type (n=3, 18%, 2002-2016)^{43, 49, 51}, buying power and economies of scale of stores (n=6, 50%, 2007-2021)^{39, 42, 43, 45, 48, 51}, freight and fuel costs (n=9, 53%, 2008-2021)^{39, 41-43, 46-49, 51}, and lack of competition (n=3, 18%, 2014-2021, Table 3).^{41, 42, 55} Other less frequently mentioned drivers (<18%) were weather, limited availability of generic products, product wastage, double handling of prices and the location of distribution centres.^{41, 45, 46, 48, 51, 56}

Infrastructural drivers of food price

One qualitative study in NT and WA (1991) reported maintenance and repairs of food storage facilities at remote stores as another infrastructural driver of food price.⁵⁶ This was reported to be most apparent during wet seasons, where the author commented that stores may be cut off for up to five months per year, and stores are required to carry extra stock, putting stress on storage infrastructure.⁵⁶

Transport and freight were determined as a factor affecting the price of food in three studies (NT and WA, 1991-2017, 15%), with all three studies reporting high freight costs as a driver of high food prices.^{55, 56, 58} All three studies were qualitative studies, with issues with refrigeration during long freight journeys, as well as the type of freight used (barge, truck or air freight) established in two of the qualitative studies as impacting prices (1991-2014).^{56, 58} The 1991 study in the NT reported high spoilage rates when perishable items such as fruit and vegetables are transported by sea freight.⁵⁶ One study (2014, WA) reported that 46% of store managers interviewed stated transportation and freight issues as the most common problem relating to higher food price in remote and very remote areas.⁵⁸ One of the three studies (2014) also determined road conditions as a factor, discussing the impacts of seasonal flooding on transport infrastructure.⁵⁸ Authors discussed weather patterns, including wet season, and remoteness impacting increasing freight costs, as well as stock losses or wastage associated with transport and freight failures.^{56, 58}

Economic drivers of food price

In 1991, McMillan reported economic drivers of high food price included the cost of carrying extra stock during the wet season, the maintenance costs of store equipment, and the high cost of electricity.⁵⁶ Operating costs were also ascertained as significant economic drivers of food price in remote areas in two qualitative studies (10%, 1991 and 2018).^{54, 56} Three papers (1991-2018, 15%) discussed cross-subsidisation (subsidy and price increase combinations to increase purchasing of healthy food and reduce the purchase of unhealthy foods) as an economic driver of food price in remote stores.^{46, 54, 56} A 50% subsidy on fruit and vegetable prices, funded by an increase in the price of cigarettes applied in store, was reported in 1991⁵⁶, whilst Ferguson et al., in 2018, reported the magnitude of price changes arising from cross-subsidisation ranged from 5-25%.⁵⁴ Although cross subsidisation is used to drive access to healthy food, Lee et al. (2016, very remote SA) reported that despite cross-subsidisation, where mark-ups on discretionary products subsidise mark-downs on healthy food items, discretionary items in the basket had less of a price discrepancy between the remote stores and the regional

centre than the healthy food items in the basket.⁴⁶ In the same study, the use of cross-subsidisation helped to reduce the price gap for fruit and vegetables between the regional centre and remote stores from 2008 to 2014.⁴⁶ Another study (2017, WA, qualitative) reported “store decisions” as inflating food prices, but did not elaborate further.⁵⁵

Type of store, for example a privately run store, community-run store or specialty store, was reported by two studies (2016) as another economic driver of food price, with privately run ‘convenience’ stores (n=2) reported to be 15% more expensive than their community owned (n=5, store management group in very remote SA) counterparts in remote communities.^{46, 51} Across Queensland and all remoteness categories, food purchased at supermarkets was statistically significantly less expensive than food in specialty and independent stores.⁵¹ The authors discussed the dominant supply chains used by supermarkets, and the ability of chain stores to take advantage of economies of scale and absorbing transportation costs to keep food price lower than those of independent stores in outer regional to very remote areas.⁵¹ One qualitative study (2015) reported food origin as a driver of food price in outer regional areas, with a reliance on imported food from overseas rather than locally produced food that is favoured for supermarkets in metropolitan areas.⁵⁷ Lack of competition was stated by one qualitative study (2017, WA) as a driver of elevated food cost.⁵⁵

Environmental drivers of food price

A 1991 study reported the weather as an environmental driver of food price, connecting high food prices in remote areas to communities being cut off during wet seasons and having to utilise high-cost air freight to ensure food availability for communities, as well as increasing cost of storage facilities with storing of extra stock and increased stock wastage.⁵⁶ An outer regional and remote WA study (2017) reported that stores were accessing cheaper prices by using ‘second-quality’ produce.⁵⁵

INSERT TABLE 2 HERE

INSERT TABLE 3 HERE

Implications for policy and practice

Government intervention, including mention of subsidies on core foods and fruit and vegetables, was proposed by eleven studies (55%, 1987-2022) across a range of remoteness categories as a solution to higher food prices (Table 3).^{15, 39, 44-47, 50, 51, 54, 55, 57} Monitoring was framed as a tool to help inform policy and identify population groups in need of government policy to address price inequities and variability and form a basis for advocacy. The need for partnerships between sectors, agencies, organisations, and between retailers was highlighted by four studies (1991-2017).^{45, 47, 55, 56} Food price monitoring or expansion of monitoring was also called for by eight studies (40%, 2002-2021). These studies were mostly based in outer regional and remote areas.^{39-43, 45, 47, 49}

Further investigation and intervention in transport and supply logistics and efficiencies was recommended by four studies (2014-2016, 20%), including supply chain resilience in rural and remote locations and targeting manufacturers and wholesalers to increase efficiencies and reduce costs.^{39, 45, 51, 58} One paper (1991) called for the involvement of Aboriginal communities in the formulation of policies and programs to strengthen sustainability,⁵⁶ and two studies (2016-2017) called for an increase in local food supply options to increase food supply resilience in communities.^{51, 55}

CREATE and CONSIDER tools

Nine of the included papers reported on Aboriginal and Torres Strait Islander populations or communities and were deemed to indirectly or directly impact these communities and were therefore assessed using the CREATE tool with additional CONSIDER areas (Supplementary Material 3). Whilst the authors may have had Aboriginal and Torres Strait Islander leadership within their research, only one paper reported on this,⁴⁶ with no papers reporting on the use of an Indigenous methodology in their studies. Seven papers (78%) took a strengths-based approach,^{39, 42, 45, 46, 54, 56, 58} with the remaining two studies partially reporting this.^{50, 52} All papers were focussed on building critical evidence for

change as a benefit for Aboriginal and Torres Strait Islander community, or building recognition for work completed. The use of the evidence was reported in one paper as driving nutrition promotion activities in community.⁴⁶ Two papers (22%) reported on Aboriginal and Torres Strait Islander research governance and one reported capacity strengthening for communities.^{46, 56}

Discussion

This systematic scoping review has identified existing peer-reviewed evidence on the drivers of the higher food price that has persisted in outer regional to very remote Australia for over four decades and the notable lack of evidence regarding the specificity of drivers. This review is timely, with current momentum in the area of food security in Australia; the recent announcement of the National Strategy for Food Security in Remote Aboriginal and Torres Strait Islander Communities (National Strategy) and the Northern Territory Remote Stores Program.^{28, 59} The National Strategy encompasses the food system through seven pillars of food security, including health and nutrition, remote retail, and supply chains.²⁸ The NT Remote Stores Program is legislated through the NT Government Food Act 2004, and aims to improve the availability and variety of healthy food and drinks in remote areas.⁵⁹ There is also development underway regarding a National Food Security Strategy: Feeding Australia, to create a resilient food supply chain.³¹ These strategies will not achieve improved food security for outer regional to very remote Australia without encompassing the drivers of higher food prices as a contributor to food insecurity.

The lack of further exploration beyond remoteness into the underlying drivers of higher food price, identified through this review, exposes a critical evidence gap that may result in the root causes of the disparity in food cost between urban and remote areas being overlooked in policy and thereby not being effectively addressed. The Commonwealth Government has recently rolled out the Low Cost Essentials Subsidy Scheme under the National Strategy, which is the first time a national government subsidy will lower the cost of essential items for participating community stores. Evidence of drivers of food

costs will be essential however to finding a long-term policy solution to higher food costs for remote and outer regional communities. A survey, recently co-designed for use in very remote community stores, includes 26 environmental factors resulting from a review of submissions relating to factors that influence healthy food retail operations, including price, and may be a valuable tool to systematically measure, monitor and understand food price drivers in remote communities to inform effective public policy.⁶⁰ The range in the years of publication (1987-2022) of studies included in this review in addition to the consistency in reporting of higher food prices, highlights that many of the same drivers of food prices in outer regional to very remote Australia have persisted for almost four decades, with limited mitigation of these. This is consistent with largely the same determinants of higher food prices reported by the three parliamentary inquiries into food price and food security since 2009. The 2009 Inquiry into Community Stores in Remote Aboriginal and Torres Strait Islander Communities reported the high cost of freight to remote locations, resulting in high food prices.³⁰ This was also reported in the 2020 Inquiry into Food Pricing and Food Security in Remote Indigenous Communities and the 2023 Inquiry into Food Security in Australia, in which there were calls for the introduction of a freight subsidy to lower prices in remote communities.^{29, 31} Although a wealth of anecdotal evidence was submitted to these inquiries on high freight costs, few peer-articles in this review examined this and with limited specificity on the underlying reasons for high freight costs. Internationally, Nutrition North Canada has highlighted a lack of competition in the remote freight sector which hinders negotiations with companies for lower prices.⁶¹ It is noted that in remote Australia, few operators are able to viably operate in this context, giving rise to a similar lack of competition as that experienced in Northern Canada.⁶² The introduction of the Food Mail Program in Canada, a government program that covered part of the freight costs of healthy foods to remote communities, resulted in lower healthy food pricing; however, despite this freight subsidy, food remained unaffordable.⁶³ A review of the National Freight and Supply Chain Strategy by the Australian Government, completed in 2024, showed stakeholders called for a greater focus on safe, secure and resilient supply chains and recommended building

resilience into existing supply chains to address future natural disasters and climate risk.⁶⁴

In response to public submissions to the 2020 Inquiry into Food Pricing and Food Security in Remote Indigenous Communities, the Australian Government supported two recommendations, with another eight recommendations supported in principle, including the establishment of local distribution centres and the introduction of a competitive remote community grants program.⁶⁵ The Government noted the recommendation to upgrade coastal and road infrastructure to remote First Nations communities.⁶⁵ In such a profound policy vacuum, researchers have continued to highlight the high cost of food in outer regional to very remote areas in comparison to metropolitan areas with a lack of attention as seen with this review on the drivers. This advocacy has contributed to recent and long overdue government action intended to address food affordability. The Low-Cost Essentials Subsidy Scheme is available to very remote stores serving a majority Aboriginal and Torres Strait Islander population to address food security as part of the National Agreement on Closing the Gap.^{66, 67} The Low-Cost Essentials Subsidy Scheme will subsidise freight on 30 essential items in remote stores that sign up to the Scheme.⁶⁶ The Queensland Government has also recently released their Remote Communities Freight Assistance Scheme, applying a freight discount on essential goods to remote community stores, applied at the point of purchase to the customer.⁶⁸ These are welcomed outcomes, particularly with four decades of literature highlighting remoteness as a driver of high food costs in outer regional to very remote areas. However, the subsidisation of freight may not be the most sustainable policy response to high freight costs as a driver of high food costs, without nuanced evidence on what the determinants of higher freight costs are. These policies will be important to evaluate in order to provide evidence on their impact on food pricing and food affordability, and thus, health outcomes, for remote Australia. This does not, however, address higher food costs for outer regional Australia. For sustainable food policy, those most impacted by high food costs, including Aboriginal and Torres Strait Islander communities, need to be contributing to decision-making. The newly released National Strategy has established a

Project Reference Group to govern the development of the Strategy, with representatives from Aboriginal community controlled health organisation peak bodies providing oversight and direction.²⁸ As this work progresses, there is a need to continually ensure that Aboriginal and Torres Strait Islander Peoples have a voice in policy that impacts their communities and to ensure policies are addressing community needs for the best chance of impacting on NCDs.

The majority of studies used a 'food basket' method to measure the cost of food in outer regional to very remote Australia. These are widely used tools across Australia as well as internationally, with tools such as the Global Healthy Diet basket used by organisations such as the United Nations Food and Agriculture Organisation and World Bank to monitor food cost globally.⁶⁹ In Australia, the Northern Territory Government has monitored food price biannually using the NT Market Basket Survey tool, with non-routine reporting of food price in other jurisdictions.⁷⁰ Several papers included in this review have called for the government to monitor food pricing. Monitoring should be done with the purpose of driving policy action. However monitoring of food price alone without attention to the drivers including the self-determination of Aboriginal and Torres Strait Islander peoples and other communities to provide leadership and have a say in policies that impact them, is likely to not lead to the changes needed to build resilience into food supply chains.

The CREATE tool and CONSIDER statement criteria highlights what is now considered best practice when working with Aboriginal and Torres Strait Islander communities. This is not yet common practice, and caution was taken when interpreting the results. Studies reporting on their Aboriginal and Torres Strait Islander leadership reflected the Indigenous data governance and sovereignty principle of "interpretation by Aboriginal and Torres Strait Islander experts, ensuring it reflects Aboriginal and Torres Strait Islander lived experiences and perspectives".⁷¹ All papers reflected Aboriginal and Torres Strait Islander priorities⁷¹ and took some form of a strengths-based approach, helping to change the conversation around the social determinants of health, including food price.⁷²

Authors emphasised in the articles how evidence generated is critical for change. However, our analysis highlighted the need for sustainability and translation of research to be described in the academic literature, and for scholars to recognise this as valuable work to report on. With these tools, it is expected that reporting of the included criteria will improve into the future. Use of these tools, particularly at the stage of study concept, will ensure a partnered approach of Indigenous and non-Indigenous peoples in generating evidence to advocate for system changes that impact food price and lead to more sustainable and equitable outcomes.

This scoping review had some limitations. Firstly, the scoping review protocol was not registered with a systematic review registry. Secondly, as there is no extensive list of the drivers of the cost of food in outer regional to very remote Australia, these terms were not specifically included in the search strategy, and therefore some relevant studies may not have been identified. Whilst there is anecdotal evidence on the environmental determinants of food prices in submissions to previous parliamentary inquiries, this scoping review only includes peer-reviewed academic literature, and did not explore grey literature sources, as it aimed to examine empirical measures of these determinants. The scope of the review was limited to health-focussed databases, which may have limited results. The databases chosen were those utilised in the authorship team's scope of research, and with the use of artificial intelligence, which is rapidly developing, there may be the ability in future works to expand the scope beyond the traditional health focussed databases for the vast topic of food pricing. Quality assessment was not performed on all included papers as part of this scoping review. Instead, this review sought to describe the drivers of food cost identified in the literature and authors' commentary on these drivers.

Conclusions

This scoping review has identified the drivers of food cost in outer regional, remote and very remote Australian communities, as identified in peer-reviewed literature. Over four decades, papers highlighted remoteness as the sole driver of high food prices, with some

papers commenting on this to be due to high freight cost and severe weather events. Few papers over the four decades examined other drivers, with freight and operating costs being stated as key drivers. Further empirical evidence on these persistent drivers of high food prices can help inform effective and sustainable policy initiatives and governmental support to build stronger food systems that promote health, food security, food sovereignty, and equitable food pricing across Australia.

List of Abbreviations

ASGS, Australian Statistical Geography Standard

CONSIDER, Consolidated criteria for strengthening the reporting of health research involving Indigenous Peoples

CREATE, Centre for Research Excellence in Aboriginal Chronic Disease Knowledge Translation and Exchange

DALY, Disability-adjusted Life Year

NCD, Noncommunicable Disease

NSW, New South Wales

NT, Northern Territory

PICO, Patient/problem, Intervention, Comparison, Outcome

PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses

QLD, Queensland

SA, South Australia

VIC, Victoria

WA, Western Australia

Additional Files

Additional File 1.doc, PRISMA Checklist, CREATE Tool Assessment

Declarations

Ethics approval and consent to participate: Not applicable. No human or animal participants were included, and all data utilised was available in the public domain.

Consent for Publication: Not Applicable.

Availability of data and materials: The datasets used and/or analysed in the current study are available from the corresponding author on reasonable request.

Declarations of interest: GD is employed by Community Enterprise Queensland (CEQ). CEQ is a not-for-profit organisation committed to providing essential goods and services to communities in the Torres Strait, Northern Peninsula Area and remote Aboriginal communities. CEQ is responsible for the operation of 27 grocery stores throughout these remote areas, providing access to fresh food, groceries and essential services. The remaining authors declare that they have no competing interests.

Funding disclosure: JB is supported by a National Health and Medical Research Council Investigator Grant [GNT2017170]. EvB is also supported by this Investigator Grant. MF is supported by a National Health and Medical Research Council Investigator Grant [GNT2034809].

Authors' contributions:

JB developed the initial research idea. JB, EvB and CM led the design of the study, with input from all authors (JD, BC, FN, EM, MF, GD). EvB and JD screened articles, extracted and synthesised data, supported by JB. EvB and JD performed the quality assessment, with support from BC and FN and senior author JB. EvB wrote the manuscript with JB and all authors reviewing draft and final versions of the manuscript.

Acknowledgements:

Not applicable

References

1. FAO, IFAD, et al. The state of food security and nutrition in the world 2020. Transforming food systems for affordable healthy diets. Rome: FAO; 2020.
2. World Health Organisation. Global Action Plan for the prevention and control of noncommunicable diseases 2013-2020. Geneva; 2013.
3. Food and Agriculture Organisation. Food Security: policy brief. Rome: FAO; 2006.
4. Menzies School of Health Research. Developing a Good Food System in your community Darwin: Menzies School of Health Research; 2016.
5. The Australian Centre for Housing Research. Accessibility/Remoteness Index of Australia (ARIA+) n.d. [Available from: <https://able.adelaide.edu.au/housing-research/data-gateway/aria>].
6. Australian Institute of Health and Welfare. Rural and remote health. Canberra: AIHW; 2025.
7. Australian Bureau of Statistics. Remoteness Structure – Australian Statistical Geography Standard (ASGS) Edition 3 Canberra: ABS; 2021 [Available from: <https://www.abs.gov.au/statistics/statistical-geography/remoteness-structure>].
8. Australian Institute of Health and Welfare. Determinants of health for Indigenous Australians Canberra: AIHW; 2022 [Available from: <https://www.aihw.gov.au/reports/australias-health/social-determinants-and-indigenous-health>].
9. Barclay L, Phillips A, et al. Rural and remote health research: Does the investment match the need? The Australian journal of rural health. 2018;26(2):74-9.
10. Phillips A. Health status differentials across rural and remote Australia. The Australian journal of rural health. 2009;17(1):2-9.
11. Australian Institute of Health and Welfare. Rural and remote health Canberra: AIHW; 2022 [Available from: <https://www.aihw.gov.au/reports/rural-remote-australians/rural-and-remote-health>].
12. Australian Institute of Health and Welfare. Profile of Indigenous Australians Canberra: AIHW; 2022 [Available from: <https://www.aihw.gov.au/reports/australias-health/profile-of-indigenous-australians>].
13. Australian Institute of Health and Welfare. Australian Burden of Disease Study: impact and causes of illness and death in Aboriginal and Torres Strait Islander people 2011—summary report. Canberra: AIHW; 2016.
14. Alston L, Walker T, et al. Characterizing Dietary Intakes in Rural Australian Adults: A Systematic Literature Review. Nutrients. 2020;12(11):3515.
15. Love P, Whelan J, et al. Healthy Diets in Rural Victoria-Cheaper than Unhealthy Alternatives, Yet Unaffordable. International journal of environmental research and public health. 2018;15(11):2469.
16. Lo Y-T, Chang Y-H, et al. Health and Nutrition Economics: Diet Costs are Associated with Diet Quality. Asia Pacific Journal of Clinical Nutrition. 2009;18(4):598-604.
17. Coveney J, O'Dwyer LA. Effects of mobility and location on food access. Health & place. 2009;15(1):45-55.
18. Whelan J, Millar L, et al. You Can't Find Healthy Food in the Bush: Poor Accessibility, Availability and Adequacy of Food in Rural Australia. International journal of environmental research and public health. 2018;15(10):2316.
19. van Burgel E, Greenacre L, et al. Assessing food retail access in remote Australia: revealing an unrepresented setting in the national food retail landscape. Australian and New Zealand journal of public health. 2024;48(6):100207.
20. Martinez O, Rodriguez N, et al. Supermarket retailers' perspectives on healthy food retail strategies: in-depth interviews. BMC public health. 2018;18(1):1019-.
21. Aboriginal Medical Services Alliance Northern Territory. Food security in the Northern Territory Alice Springs: AMSANT; 2021 [Available from: <http://www.amsant.org.au/wp-content/uploads/2021/10/Community-Consultation-Results-and-Discussion-Paper-V2.pdf>].
22. National Rural Health Alliance. Inquiry into food pricing and food security in remote Indigenous communities: NRHA; 2020 [Available from: <https://www.ruralhealth.org.au/sites/default/files/documents/nrha-policy-document/submissions/nrha-submission-food-pricing-food-security-remote-indigenous-communities.pdf>].
23. Northern Territory Government. Northern Territory Market Basket Survey 2023. Darwin: NT Gov; 2023 2024 Jun 5.

24. Brimblecombe JK, O'Dea K. The role of energy cost in food choices for an Aboriginal population in northern Australia [Paper in: Indigenous Health]. Medical journal of Australia. 2009;190(10):549-51.
25. Zorbas C, Palermo C, et al. Factors perceived to influence healthy eating: a systematic review and meta-ethnographic synthesis of the literature. Nutrition reviews. 2018;76(12):861-74.
26. HLPE. Nutrition and food systems. Rome; 2017.
27. United Nations. Universal Declaration of human rights 1948. Available from: <https://www.un.org/en/about-us/universal-declaration-of-human-rights>.
28. Commonwealth of Australia. National Strategy for Food Security in Remote Aboriginal and Torres Strait Islander Communities. In: Agency NIA, editor. Canberra: Australian Government; 2025. p. 76.
29. Parliament of Australia. Report on food pricing and food security in remote Indigenous communities. Canberra: Australian Government; 2020.
30. Parliament of Australia. Everybody's Business. Remote Aboriginal and Torres Strait Community Stores. Canberra: Australian Government; 2009.
31. Parliament of Australia. Australian Food Story: Feeding the Nation and Beyond Inquiry into food security in Australia. Canberra: Australian Government; 2023.
32. Joanna Briggs Institute. Resources: JBI; 2023 [Available from: A mixed-methods study to determine the impact of COVID-19 on food security, food access and supply in regional Australia for consumers and food supply stakeholders.
33. Page MJ, McKenzie JE, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ (Online). 2021;372:n71.
34. Khalil H, Peters M, et al. An Evidence-Based Approach to Scoping Reviews. Worldviews on evidence-based nursing. 2016;13(2):118-23.
35. Joanna Briggs Institute. 2.6.5 Search strategy: JBI; 2022 [Available from: <https://jbi-global-wiki.refined.site/space/MANUAL/4688238>.
36. Richardson WS, Wilson MC, et al. The well-built clinical question: a key to evidence-based decisions. ACP journal club. 1995;123(3):A12-A3.
37. Huria T, Palmer SC, et al. Consolidated criteria for strengthening reporting of health research involving indigenous peoples: the CONSIDER statement. BMC Medical Research Methodology. 2019;19(1):173.
38. Harfield S, Pearson O, et al. Assessing the quality of health research from an Indigenous perspective: the Aboriginal and Torres Strait Islander quality appraisal tool. BMC Medical Research Methodology. 2020;20(1):79.
39. Pollard CM, Landrigan TJ, et al. Geographic Factors as Determinants of Food Security: A Western Australian Food Pricing and Quality Study. Asia Pacific Journal of Clinical Nutrition. 2014;23(4):703-13.
40. Ward PR, Coveney J, et al. Cost and affordability of healthy food in rural South Australia. Rural and remote health. 2012;12:1938-.
41. Chapman K, Kelly B, et al. Trends in the cost of a healthy food basket and fruit and vegetable availability in New South Wales, Australia, between 2006 and 2009. Nutrition & dietetics. 2014;71(2):117-26.
42. Lee A, Patay D, et al. Affordability of current, and healthy, more equitable, sustainable diets by area of socioeconomic disadvantage and remoteness in Queensland: insights into food choice. International journal for equity in health. 2021;20(1):1-153.
43. Palermo CE, Walker KZ, et al. The cost of healthy food in rural Victoria. Rural and remote health. 2008;8(4):1074-.
44. Darcy M, Parkinson J, et al. Geographic remoteness and socioeconomic disadvantage reduce the supportiveness of food and physical activity environments in Australia. Australian and New Zealand journal of public health. 2022;46(3):346-53.
45. Ferguson M, O'Dea K, et al. The comparative cost of food and beverages at remote Indigenous communities, Northern Territory, Australia. Australian and New Zealand journal of public health. 2016;40(S1):S21-S6.
46. Lee A, Rainow S, et al. Nutrition in remote Aboriginal communities: lessons from Mai Wiru and the Anangu Pitjantjatjara Yankunytjatjara Lands. Australian and New Zealand journal of public health. 2016;40(S1):S81-S8.
47. Harrison M, Lee A, et al. The increasing cost of healthy food. Australian and New Zealand journal of public health. 2010;34(2):179-86.
48. Harrison MS, Coyne T, et al. The increasing cost of the basic foods required to promote health in Queensland. Medical journal of Australia. 2007;186(1):9-14.

49. Lee AJ, Darcy AM, et al. Food availability, cost disparity and improvement in relation to accessibility and remoteness in Queensland. *Australian and New Zealand journal of public health*. 2002;26(3):266-72.
50. Sullivan H, Gracey M, et al. Food costs and nutrition of Aborigines in remote areas of northern Australia. *Medical journal of Australia*. 1987;147(7):334-7.
51. Singh-Peterson L, Lieske S, et al. Food security, remoteness and consolidation of supermarket distribution centres: Factors contributing to food pricing inequalities across Queensland, Australia. *Australian geographer*. 2016;47(1):89-102.
52. Gracey M, Sullivan H, et al. Food costs and nutrition in remote areas. *Medical journal of Australia*. 1991;154(4):294-.
53. Pollard CM, Nyaradi A, et al. Understanding food security issues in remote Western Australian Indigenous communities: C. M. Pollard et al. *Health promotion journal of Australia*. 2014;25(2):83-9.
54. Ferguson M, O'Dea K, et al. Health-Promoting Food Pricing Policies and Decision-Making in Very Remote Aboriginal and Torres Strait Islander Community Stores in Australia. *International journal of environmental research and public health*. 2018;15(12):2908.
55. Godrich SL, Davies CR, et al. What are the determinants of food security among regional and remote Western Australian children? *Australian and New Zealand journal of public health*. 2017;41(2):172-7.
56. McMillan SJ. Food and nutrition policy issues in remote Aboriginal communities: lessons from Arnhem Land. *Australian Journal of Public Health*. 1991;15(4):281-5.
57. Lê Q, Auckland S, et al. The Socio-Economic and Physical Contributors to Food Insecurity in a Rural Community. *SAGE open*. 2015;5(1):215824401456740.
58. Pollard CM, Nyaradi A, et al. Understanding food security issues in remote Western Australian Indigenous communities. *Health promotion journal of Australia*. 2014;25(2):83-9.
59. NT Government. NT remote stores program Darwin: NT Government; 2024 [cited 2024 Nov 15]. Available from: <https://haveyoursay.nt.gov.au/nt-remote-stores-program>.
60. van Burgel E, Fairweather M, et al. Development of a survey tool to assess the environmental determinants of health-enabling food retail practice in Aboriginal and Torres Strait Islander communities of remote Australia. *BMC Public Health*. 2024;24(1):442.
61. Crown-Indigenous Relations and Northern Affairs Canada. Horizontal evaluation of Nutrition North Canada. Gatineau: CIRNAC; 2020.
62. Torres Cape Indigenous Council Alliance Inc. Far North Queensland freight equalisation study. Carins: TCICA; 2023 2023 Feb.
63. Indian and Northern Affairs Canada. Summative evaluation of INAC's Food Mail Program. Gatineau: INAC; 2009.
64. Australian Government. Review of the National Freight and Supply Chain Strategy. Canberra: Australian Government; 2024 2024.
65. Australian Government. Australian Government response to the House of Representatives Standing Committee on Indigenous Affairs report: Inquiry into food pricing and food security in remote Indigenous communities. Canberra; 2021.
66. National Indigenous Australians Agency. The Low-Cost Essentials Subsidy Scheme (the Scheme) Canberra: NIAA; 2025 [cited 2025 Aug 13]. Available from: <https://www.niaa.gov.au/sign-national-code-and-low-cost-essentials-subsidy-scheme-now#the-lowcost-essentials-subsidy-scheme-the-scheme>.
67. Commonwealth of Australia. Closing the Gap Canberra: Department of Prime Minister and Cabinet; 2020 [Available from: <https://www.closingthegap.gov.au/>].
68. Queensland Government. Remote Communities Freight Assistance Scheme [Internet]. Brisbane: Queensland Government; 2025 [updated 2025 Jul 1. Available from: <https://www.qrida.qld.gov.au/program/remote-communities-freight-assistance-scheme>].
69. Herforth AW, Bai Y, et al. The Healthy Diet Basket is a valid global standard that highlights lack of access to healthy and sustainable diets. *Nature food*. 2025.
70. Northern Territory Government. NT Market Basket Survey 2023 Darwin: NT Government; 2023 [updated 2025; cited 2025 Jun 11]. Available from: <https://data.nt.gov.au/dataset/nt-market-basket-survey-2023>.
71. Lowitja Institute. Indigenous data governance and sovereignty Melbourne Lowitja Institute; 2023 [cited 2025 Aug 26]. Available from: https://www.lowitja.org.au/wp-content/uploads/2023/10/328550_data-governance-and-sovereignty.pdf.
72. Fogarty W, Lovell M, et al. Deficit Discourse and Strengths-based Approaches: Changing the Narrative of Aboriginal and Torres Strait Islander Health and Wellbeing. Carlton South, VIC: Lowitja Institute; 2018. Report No.: 9781921889554.

Table 2. Demographics of included studies.

Article	Author, Publication Year	Aim/Purpose	State/Territory	Remoteness classification (ASGS)	Study sample
Geographic factors as determinants of food security: a Western Australian food pricing and quality study.³⁹	Pollard et al., 2014	Explore the impact of geographical location on healthy food price and quality	WA	across remoteness categories	160 stores
Cost and affordability of healthy food in rural South Australia.⁴⁰	Ward et al., 2012	Examine the effect of rurality and socioeconomic status on affordability of healthy food	SA	remote	14 supermarkets
Trends in the cost of a healthy food basket and fruit and vegetable availability in New South Wales, Australia, between 2006 and 2009.⁴¹	Chapman et al., 2014	Compare cost and variety of fresh fruit and vegetables across New South Wales	NSW	outer regional, remote	2006 - 149 stores (23 remote) 2008 - 105 stores (9 remote) 2009 - 129 stores (30 remote)
Affordability of current, and healthy, more equitable, sustainable diets by area of socioeconomic disadvantage and remoteness in Queensland: insights into food choice.⁴²	Lee et al., 2021	Assess cost and affordability of current and recommended diets in Queensland	QLD	across remoteness categories	125 food outlets

Article	Author, Publication Year	Aim/Purpose	State/Territory	Remoteness classification (ASGS)	Study sample
Understanding food security issues in remote Western Australian Indigenous communities.⁵⁸	Pollard et al., 2014	Determine store managers' perceptions of the extent of food insecurity in their communities, key concerns relating to food in remote stores, store operations, infrastructure and resource needs.	WA	remote, very remote	33 stores
The cost of healthy food in rural Victoria.⁴³	Palermo et al., 2008	Compare the cost of nutritious foods with more unhealthy foods in regional Victoria, and to identify the relative cost of a healthy basket of foods for a range of different family types receiving government benefits.	VIC	outer regional	34 stores
Health-promoting food pricing policies and decision-making in very remote Aboriginal and Torres Strait Islander community stores in Australia⁵⁴	Ferguson et al., 2018	Describes the health-promoting food pricing policies including their alignment with evidence, and the decision-making processes in their development in very remote Aboriginal and Torres Strait Islander community stores in Australia	NT, QLD, WA, SA	remote, very remote	47 interviews with 15 retailers, 28 nutritionists, 4 health professionals servicing communities in NT, Qld, WA and SA
Geographic remoteness and socioeconomic disadvantage reduce the supportiveness of food and physical activity environments in Australia⁴⁴	Darcy et al., 2022	Assess the community food and physical environments across Queensland	QLD	across remoteness categories	25 communities

Article	Author, Publication Year	Aim/Purpose	State/Territory	Remoteness classification (ASGS)	Study sample
Healthy diets in rural Victoria-Cheaper than unhealthy alternatives, yet unaffordable¹⁵	Love et al., 2018	Assess and compare the price differential and affordability of the recommended Australian diet and the current Australian diet for a small rural Local Government Area in Victoria, Australia	VIC	outer regional	5 supermarkets, 6 general stores
What are the determinants of food security among regional and remote Western Australian children?⁵⁵	Godrich et al., 2017	Explore the impact of food security determinants on children in regional and remote WA, across food availability, access, and utilisation dimensions	WA	outer regional, remote	20 interviews with health workers, school and youth workers, food supply workers
The comparative cost of food and beverages at remote Indigenous communities, Northern Territory, Australia⁴⁵	Ferguson et al., 2016	To: i) examine the price difference of commonly purchased food and beverages in remote community stores in the Northern Territory to capital city supermarkets in Northern Territory and South Australia; and ii) explore the disparity across supply categories (fresh vs. packaged) and food groups.	NT	remote	20 remote stores
Nutrition in remote Aboriginal communities: lessons from Mai Wiru and the Anangu Pitjantjatjara Yankunytjatjara Lands⁴⁶	Lee et al., 2016	Examine the impact of approaches to improve nutrition on the APY Lands over the past three decades	SA	very remote	9 retail stores

Article	Author, Publication Year	Aim/Purpose	State/Territory	Remoteness classification (ASGS)	Study sample
The increasing cost of healthy food⁴⁷	Harrison et al., 2010	Present the cost comparison by remoteness category in 78 stores in randomised towns for 2006 and cost comparisons over time for analogous stores	QLD	across remoteness categories	78 stores
The increasing cost of the basic foods required to promote health in Queensland⁴⁸	Harrison et al., 2007	Assess changes in the cost and availability of a standard basket of healthy food items in Queensland over time	QLD	across remoteness categories	97 stores
Food availability, cost disparity and improvement in relation to accessibility and remoteness in Queensland⁴⁹	Lee et al., 2002	Describe the disparity and change in the food supply between metropolitan, rural, and remote stores by ARIA categories	QLD	across remoteness categories	92 stores
Food and nutrition policy issues in remote Aboriginal communities: Lessons from Arnhem Land⁵⁶	McMillan, 1991	Describe the approach being taken through ALPA and the implications for food and nutrition policy at the levels of both government and private enterprise	NT, WA	remote, very remote	11 stores
Food costs and nutrition of Aborigines in remote areas of northern Australia⁵⁰	Sullivan et al., 1987	Examine the costs of basic food items for families who live in the region	WA	very remote	29 stores
Food security, remoteness and consolidation of supermarket distribution	Singh-Peterson et al., 2016	Identify the spatial determinants of food pricing	QLD	outer regional, remote, very remote	89 stores

Article	Author, Publication Year	Aim/Purpose	State/Territory	Remoteness classification (ASGS)	Study sample
centres: Factors contributing to food pricing inequalities across Queensland, Australia⁵¹					
The socio-economic and physical contributors to food insecurity in a rural community⁵⁷	Le et al., 2015	Examine the physical and financial access to food of the population of a rural municipality	TAS	outer regional	364 survey responses 45 focus group participants
Food costs and nutrition in remote areas.⁵²	Gracey et al., 1991	Aim not reported	WA	very remote	8 communities

ASGS; Australian Statistical Geographical Standard, WA; Western Australia, SA; South Australia, NSW; New South Wales, QLD; Queensland, VIC; Victoria, NT; Northern Territory, ARIA; Accessibility/Remoteness Index of Australia, ALPA; Arnhem Land Progress Aboriginal Corporation, TAS; Tasmania.

Table 3. Extracted data from included studies.

Article	Author, Publication Year	Study design	Sampling	Method description	Results - determinants	Outcomes	Author commentary on determinants	Implications for policy/practice	Limitations (as reported)
Geographic factors as determinants of food security: a Western Australian food pricing and quality study. ³⁹	Pollard et al., 2014	Quantitative	random	Use of Food Access and Costs Survey Food products and brands priced based on Australian Dietary Guidelines and analysed as required for hypothetical family of 6 over a fortnight	geographical remoteness	The mean cost of a healthy food basket was 23.5% higher in very remote areas than in Perth (capital city). Cost of foods significantly increased with distance from major cities. Increase in cost between major cities and very remote areas was found across all food groups, particularly perishable foods (fruits, vegetables and dairy). Analysis	Buying power of major supermarket chains Smaller economies of smaller stores Transport and freight costs	Need to review supply chain efficiencies and identify actions to reduce the costs in remote communities Call for government to provide subsidies for rural and remote area transport of fresh foods Monitoring of food price is essential to develop effective interventions Improving transport logistics and reducing freight costs to geographically isolated areas	Not reported

Article	Author, Publication Year	Study design	Sampling	Method description	Results - determinants	Outcomes	Author commentary on determinants	Implications for policy/practice	Limitations (as reported)
Cost and affordability of healthy food in rural South Australia. ⁴⁰	Ward et al., 2012	Quantitative	stratified	Use of Victorian Food Basket Survey food cost calculated for each type of reference family and cost compared between metropolitan and rural areas and between towns within rural South Australia	geographical remoteness	excluding community stores still showed higher prices for remote and very remote areas than for other regions and major cities. The healthy - food basket was more expensive in 'more remote' locations across all reference families. A 'typical family' was paying \$21 per fortnight more for a healthy food basket than a similar family in a less remote area.		Collection and monitoring of food affordability data to inform policy response	Basket of food does not represent what people are actually eating or spending on food but rather a 'hypothetical basket' Small sample size of stores More remote areas of SA and Aboriginal communities were

Article	Author, Publication Year	Study design	Sampling	Method description	Results - determinants	Outcomes	Author commentary on determinants	Implications for policy/practice	Limitations (as reported)
Trends in the cost of a healthy food basket and fruit and vegetable availability in New South Wales, Australia, between 2006 and 2009. ⁴¹	Chapman et al., 2014	Quantitative	convenience	Use of Queensland Healthy Food Basket data collection (in New South Wales) over 3 time points. Mean cost and availability reported, and association between remoteness and socioeconomic status with grocery cost.	geographical remoteness	The cost of the total food basket was highest in remote locations (\$430.59 in remote vs. \$399.64 in highly accessible areas in 2009 (p<0.01)). Cost of total food basket was highest in remote locations in other years but not statistically significant. The mean cost of fruit and vegetables were highest in remote areas over	Severe weather conditions and higher fuel usage. Lack of competition due to duopoly of supermarket chains	Ongoing monitoring of food costs to help address the impact of price variability and identify priority population groups	not sampled Use of volunteers to collect price data. Convenience sample of stores. Lower number of stores sampled in 2008 resulting in less remote stores for comparison. Inclusion of some less healthy food choices.

Article	Author, Publication Year	Study design	Sampling	Method description	Results - determinants	Outcomes	Author commentary on determinants	Implications for policy/practice	Limitations (as reported)
						all three years (\$154.12 in remote areas vs. \$135.94 in highly accessible areas in 2009, p=0.002, other years were not statistically significant).			
Affordability of current, and healthy, more equitable, sustainable diets by area of socioeconomic disadvantage and remoteness in Queensland: insights into food choice. ⁴²	Lee et al., 2021	Quantitative	random	Use of Healthy Diets ASAP protocol. Quantities of food per fortnight were calculated for reference household of four, data collection occurred by volunteers from Queensland Country Women's Association Country Kitchens program, volunteer dietitians from Queensland Health, Indigenous community-controlled health service, and research assistants. Mean total costs of diet were calculated for the reference household per fortnight.	geographical remoteness	The costs of the current and recommended diets were similar in major cities and outer regional areas; however, the costs of both were much higher (27 and 31% respectively) in very remote areas in QLD.	High freight, operational and maintenance costs Logistical challenges Small populations Limited buying power Lack of competition	Value in assessing the cost, cost differentials and affordability by area of socioeconomic disadvantage and remoteness	Focus on mean population intake to standardise methods for comparison Randomly selected SA2 locations included only one very remote location in an area of most disadvantaged

Article	Author, Publication Year	Study design	Sampling	Method description	Results - determinants	Outcomes	Author commentary on determinants	Implications for policy/practice	Limitations (as reported)
						The costs of current and recommended diets per fortnight were 43% (A\$329.22) and 38% (A\$232.36) higher respectively in very remote locations than in major cities in QLD.			
Understanding food security issues in remote Western Australian Indigenous communities. ⁵⁸	Pollard et al., 2014	Qualitative	census	Short telephone surveys conducted with store managers asking open and close ended questions focusing on main issues within stores, point-of-sale systems, nutritionists and food security in community. Closed question data analysed descriptively and qualitative responses were grouped and coded. Descriptive analysis conducted for the remaining questions.	Transportation/freight Road conditions Distance travelled	Transport related issues were the most common problem cited (46%) with high transport costs, problems with refrigeration during long journeys, distance travelled, and variable	Infrequent food deliveries High freight costs Transport issues - road conditions, distance, logistics	Need to address basic infrastructure needs including maintenance and structural resources, food supply chain efficiencies	Findings are specific to WA and as geographic situation and store management structures vary, results may not be representative.

Article	Author, Publication Year	Study design	Sampling	Method description	Results - determinants	Outcomes	Author commentary on determinants	Implications for policy/practice	Limitations (as reported)
						road conditions being mentioned. Problems specific to fruit and vegetables were identified by 20% of participants			
The cost of healthy food in rural Victoria. ⁴³	Palermo et al., 2008	Quantitative	convenience	Use of the Victorian Healthy Food Basket. Selection of 34 supermarkets in rural and regional areas of Victoria, cost of basket that meets nutritional requirements for a fortnight for four different family types, data analysed statistically and relationships between the cost and indices of remoteness and SEIFA as well as population density assessed.	geographical remoteness	Cost of a healthy food basket was significantly related to remoteness .	Store type and store buying power Ease of transport/reight (major road or rail services)	National system to monitor healthy food prices	Convenience sample does not represent all rural towns in Victoria. Inadequate sample of smaller towns Recording of most inexpensive brand of product, not cheapest available (generic product). Basket is based on a limited

Article	Author, Publication Year	Study design	Sampling	Method description	Results - determinants	Outcomes	Author commentary on determinants	Implications for policy/practice	Limitations (as reported)
Health-promoting food pricing policies and decision-making in very remote Aboriginal and Torres Strait Islander community stores in Australia ⁵⁴	Ferguson et al., 2018	Qualitative	purposive	Semi-structured interviews regarding price increases and subsidies, and decision-making processes for policies reported. Data content analysis, coding and theming.	Cross subsidisation of healthy and unhealthy items Operating costs	The most commonly implemented food pricing policies across very remote areas were subsidy/price increase combinations, ranging from 5-25%, and targeting fruit, vegetables, bottled water, artificially sweetened and sugar sweetened carbonated	Subsidies (lowers the price)	Role for government, manufacturers and wholesalers to support efforts	food culture and does not take into account the diverse food cultures found in Victoria Resources did not allow for interviews in remote communities with Aboriginal and Torres Strait Islander store committee/board members

Article	Author, Publication Year	Study design	Sampling	Method description	Results - determinants	Outcomes	Author commentary on determinants	Implications for policy/practice	Limitations (as reported)
						beverages. A second policy objective was addressing equity and providing access to healthy food at prices comparable outside of very remote areas. Operating costs were raised as significant pertinent factors [to increased price].			
Geographic remoteness and socioeconomic disadvantage reduce the supportiveness of food and physical	Darcy et al., 2022	Quantitative	purposive	Use of NEM-S and NEMS-R to assess nutrition environments. Total mean scores calculated and mean scores for each subcomponent, Spearman's correlation tests performed.	geographical remoteness	Price was negatively correlated with remoteness ; the more remote the region, the higher the price of food items.	-	Fresh food delivery subsidies to increase the availability of healthy options in economically disadvantaged and regional or remote suburbs place-based approaches	Only evaluates a sample of the Qld region Limitations with instruments used

Article	Author, Publication Year	Study design	Sampling	Method description	Results - determinants	Outcomes	Author commentary on determinants	Implications for policy/practice	Limitations (as reported)
activity environments in Australia⁴⁴									
Healthy diets in rural Victoria-Cheaper than unhealthy alternatives, yet unaffordable¹⁵	Love et al., 2018	Quantitative	purposive	Data were analysed to explore price differential and affordability of the recommended diet and current diet for the reference household. Price differentials compared by total diet; food groups. Wilcoxon-signed ranks test used to compare total diet costs between towns, and between the northern, central and southern areas of the LGA. Affordability of the recommended diet and current diet calculated as a proportion of household income using median and indicative minimum disposable incomes for an average and low-income household, respectively.	location	Differences in food prices were observed across the LGA. Food prices were lower in regional towns outside the LGA boundary. The recommended diet was cheaper than the current diet across the LGA.	Long food supply chains that are inflexible. Vast distances. Extreme temperatures. Variable road conditions	Food pricing policy options such as taxation, subsidisation, or a combination of these. Taxing of unhealthy foods and subsidising of healthy food. The exemption of healthy foods from the goods and services tax. Understanding the associations between these factors will help to shape appropriate interventions needed at the individual, organizational, community and policy level. Combination of strategies needed.	The use of average prices for missing/unavailable items may have led to an underestimation of the cost of the diet. Tool developed for different households, with the default being two adults and two children.
What are the determinants of food security among regional	Godrich et al., 2017	Qualitative	purposive	Semi structured interviews conducted in person or over the phone with questions regarding local area food environment and discussions around determinants of security.	Store decisions Cost of freight Lack of competition Quality of produce (second quality decreased price)	“Inflated prices were found in locations that relied on a single food outlet, impacted	Low competition Freight costs Increasing remoteness	Increased support for local food supply options Land use management that facilitates locally controlled food	Lack of parent and child perspectives Insufficient sample sizes for

Article	Author, Publication Year	Study design	Sampling	Method description	Results - determinants	Outcomes	Author commentary on determinants	Implications for policy/practice	Limitations (as reported)
and remote Western Australian children? ⁵				Key points/themes were recorded after each interview; interviews were transcribed and thematic analysis conducted. Data analyses included word frequencies, word clouds and matrix-coding queries.		by store decisions and transport costs. Multiple, independent food outlets and farmers' markets selling local produce just above wholesale price increased affordability, enabled competitive pricing and "value-buy in" products (i.e. second quality produce)."		production, markets, community gardens Local government facilitation of core-food freight subsidies or discounts at the store level Support for agencies to work in partnership to develop additional community-based food security options	some WA regions prevented examination of issues between regions and permissions precluded investigation of how themes may differ between specific community groups, e.g. Culturally and Linguistically Diverse people and Aboriginal and Torres Strait Islander people.
The comparative cost of food and beverages	Ferguson et al., 2016	Quantitative	convenience	Supermarket retail prices were collected for a product list from two major Australian supermarket chains in	geographical remoteness	60% price difference, on average, between remote NT	Limited promotional pricing funded from	Expanding price surveys to additional regional and remote stores that purchase	Limited to remote community stores in the NT

Article	Author, Publication Year	Study design	Sampling	Method description	Results - determinants	Outcomes	Author commentary on determinants	Implications for policy/practice	Limitations (as reported)
at remote Indigenous communities, Northern Territory, Australia ⁴⁵				Darwin and Adelaide. Electronic point-of-sale data was collected from remote stores and uploaded to a database where it was coded using Food Standards Australia and New Zealand coder. An average remote retail price was determined for each product. Supermarket prices were collected using online websites. Mean pricing for remote stores was compared to mean pricing for urban supermarkets.		community stores and Darwin supermarkets. On average, remote store products were 106% more expensive when generic products were substituted for branded products in the metropolitan supermarket. 5% of products were cheaper in remote stores than in the supermarket.	wholesale suppliers remote community stores Generic products are not currently available through wholesale suppliers remote community stores in the NT in the same range or at the same level of savings as in supermarkets	from the major national wholesaler Generating savings at the manufacturer and/or wholesaler level that are passed onto customers Exploring retail partnerships that provide remote access to similar benefits as supermarket customers Exploring opportunities to increase the supply and promotion of low cost, quality, nutritious products in remote stores. policy targeted at manufacturers, wholesalers and major supermarket chains, strategies to reduce the price of basic healthy foods in remote stores.	where factors affecting food cost may be different from other remote areas. Limited to stores owned or managed by two associations hence, prices may be reduced by the buying power and pricing policies of these relatively large organisations, thereby affecting the generalisability to all remote community stores.

Article	Author, Publication Year	Study design	Sampling	Method description	Results - determinants	Outcomes	Author commentary on determinants	Implications for policy/practice	Limitations (as reported)
Nutrition in remote Aboriginal communities: lessons from Mai Wiru and the Anangu Pitjantjatjara Yankunytjatjara Lands ⁴⁶	Lee et al., 2016	Quantitative	purposive	Systematic literature search for peer reviewed and grey literature using 4 databases, 2 citation indexes and 8 websites. 2 document searches in two organisations Mai Wiru and Nganampa Health Council. In addition, historic apparent dietary intake and food price and availability data for communities on the APY Lands and food price data from a small and a large supermarket in Alice Springs were also transcribed for analysis. Use of Market Basket	Geographical remoteness Type of store (private versus store management group) Cross subsidisation	Food pricing of basic healthy foods in very remote communities was, on average, 35% more expensive than larger supermarkets in the nearest regional centre. Privately run convenience	Freight costs High store overheads Wastage of food Size of store Type of freight/usage of secondary mode of freight	Public regulations and market intervention are required to improve diet	Use of online supermarket prices is likely to moderately underestimate the price disparity between remote store and in-store supermarket purchases Food prices were collected opportunistically, rather than regularly at the same time of year Some historical store price data were missing With the permission

Article	Author, Publication Year	Study design	Sampling	Method description	Results - determinants	Outcomes	Author commentary on determinants	Implications for policy/practice	Limitations (as reported)
				Survey in addition to collection of food prices from two privately run stores on APY Lands.		e stores were more expensive. Despite cross-subsidisation in store group managed stores, discretionary foods were still cheaper than healthy foods.			of the APY communities, food prices and implementation against RIST healthy food checklists were assessed in all Mai Wiru and other APY community stores but only food price data was able to be collected in the two smaller private, convenience stores. Comparable dietary intake data are not available for all APY communities.

Article	Author, Publication Year	Study design	Sampling	Method description	Results - determinants	Outcomes	Author commentary on determinants	Implications for policy/practice	Limitations (as reported)
									Consistent methods were applied to enumerate the 'usual' Indigenous population relying on each community store as the major source of food in 1986 and 2012, but such estimates are unlikely to be robust. Estimations of foods from other sources, including traditional bush foods, were not included, as per the validated approach. No application

ARTICLE IN PRESS

Article	Author, Publication Year	Study design	Sampling	Method description	Results - determinants	Outcomes	Author commentary on determinants	Implications for policy/practice	Limitations (as reported)
									of a correction factor for food wastage, which may have been lower in 2012 due to improved housing. Some of the data were by service providers and local community members, several who had been involved originally in the commitment to ongoing program evaluation and improvement.

ARTICLE IN PRESS

Article	Author, Publication Year	Study design	Sampling	Method description	Results - determinants	Outcomes	Author commentary on determinants	Implications for policy/practice	Limitations (as reported)
The increasing cost of healthy food⁴⁷	Harrison et al., 2010	Quantitative	stratified	Use of the Healthy Food Access Basket Survey	Geographical remoteness	The mean cost of a healthy food basket was over 24% higher in very remote stores, compared with the cost in major cities. The further a store from the capital city, the higher the price differential.	Higher freight costs Increased fuel costs	National data collection and assessment of a CPI for healthy food and for towns in addition to capital cities. Establishment of a coordinated national food and nutrition monitoring and surveillance system to provide food pricing data across Australia Sustainable solutions require joint commitment and partnerships across a range of sectors and levels of government and non-government organisations	Lack of information about changes in stores over time Lack of a rigorous framework to standardise unhealthy items High proportion of missing items
The increasing cost of the basic foods required to promote health in Queensland⁴⁸	Harrison et al., 2007	Quantitative	purposive	Cross-sectional surveys across four time points describing the cost and availability of foods in the Healthy Food Access Basket over time. The cost of the total Healthy Food Access Basket; the fruit, vegetables and legumes in the basket; and the unhealthy items were compared by remoteness category for the stores surveyed. Changes in cost and	Geographical remoteness	Increasing food prices with increasing remoteness category, with an increase in the price of 81 stores from 2000-2004. The cost of a healthy food access	Freight costs Double handling of produce through secondary wholesalers Limited economies of scale Small customer	Investigation into factors affecting price so strategies can be developed to improve affordability and access to healthy food	Not reported

Article	Author, Publication Year	Study design	Sampling	Method description	Results - determinants	Outcomes	Author commentary on determinants	Implications for policy/practice	Limitations (as reported)
				availability of foods since the previous two surveys were analysed by remoteness category for stores that were included in all three surveys. Further comparisons of food prices were made for stores that were included in all four surveys, and increases were compared with increase in the Consumer Price Index for food in Brisbane over the same period.		basket increased significantly more in very remote areas (18%, \$48.45) compared to major cities (13.2%, \$44.96, $p < 0.001$). The further a store from the capital city, the higher the price differential. The healthy food access basket was 29.6% higher in the very remote category than the major cities category.	base Higher overhead costs		
Food availability, cost disparity and improvement	Lee et al., 2002	Quantitative	purposive	Use of the Healthy Food Access Basket survey. The amounts and types of food items included in the basket were chosen considering most	Geographical location	Strong correlations between the cost of food baskets and	Transport distance Size of store Freight costs	Food supply monitoring to provide basis for advocacy to key partners who have the ability to influence food supply	Potential bias as stores in 'very remote' communities

Article	Author, Publication Year	Study design	Sampling	Method description	Results - determinants	Outcomes	Author commentary on determinants	Implications for policy/practice	Limitations (as reported)
ent in relation to accessibility and remoteness in Queensland ⁴⁹				commonly available foods and the nutritional requirements of a reference family of six people for two weeks based on Model B of The Core Food Groups. Data were collected on site by public health nutritionists and local health workers. The change in price of food baskets from 1998 to 2000 was investigated by comparison of costs in stores surveyed in both years and compared with the Consumer Price Index increase in Brisbane and Australia calculated for food over the same period. Data were entered into a Microsoft Access database and transported into SPSS for analysis.		remoteness categories in 2000. The cost of a healthy food basket was 31% higher and the cost of fruit, vegetables and legumes in the basket was 29% higher in very remote areas than highly accessible areas. Remoteness explained 58% of the total variance in the price of a healthy food access basket. The cost disparity for tobacco and takeaway items was less than for the	Use of secondary freight	Feedback of results to encourage implementation of local initiatives to improve supply and retail price of basic and healthy food Development and implementation of a comprehensive and standardised system to measure access to basic healthy food.	es were over-sampled in the HFAB 2000 survey and almost half the stores in the 'very remote' ARIA category in the 2000 HFAB survey had participated in food supply and nutrition interventions

Article	Author, Publication Year	Study design	Sampling	Method description	Results - determinants	Outcomes	Author commentary on determinants	Implications for policy/practice	Limitations (as reported)
Food and nutrition policy issues in remote Aboriginal communities: Lessons from Arnhem Land⁵⁶	McMillan, 1991	Qualitative	convenience	-	Weather Freight costs Storage (carrying extra stock) Waste Maintenance and repairs Cost of operations Type of freight Geographical location (nearest city is Darwin which is already remote)	healthy food basket. Store prices are affected in Darwin by the lack of capital city pricing. Darwin is treated by national suppliers as a rural centre and less than 5 per cent of products are sold at capital city prices. Thus, the base price for most foods is higher than in any other Australian capital city. This higher price is passed on to the remote communities. Store may be cut off	Weather (wet season) Stock losses/wastage Cost of electricity	Involvement of Aboriginal people in formulation of policies and programs is vital and coordination of programs promotion of cooperation between the government and nongovernment sectors	Not reported

Article	Author, Publication Year	Study design	Sampling	Method description	Results - determinants	Outcomes	Author commentary on determinants	Implications for policy/practice	Limitations (as reported)
						<p>during wet season, except for air deliveries, with costs relating to carrying extra stock and very high stock losses having a significant effect on the final price. Increased costs for electricity are increasing food price. As freight is a significant component of the price of fruit and vegetables, the directors moved to introduce a 50% subsidy on fruit and vegetable</p>			

Article	Author, Publication Year	Study design	Sampling	Method description	Results - determinants	Outcomes	Author commentary on determinants	Implications for policy/practice	Limitations (as reported)
Food costs and nutrition of Aborigines in remote areas of northern Australia ⁵⁰	Sullivan et al., 1987	Quantitative	cluster	Development of a 'Kimberley' Market Basket based upon the most popular, regular food store purchases. The costs of items in the local market basket were determined by a nutritionist in collaboration with Aboriginal health workers, public health nursing sisters and storekeepers in Aboriginal communities. Costs for the same items in were obtained from five supermarkets in major shopping complexes in the Perth metropolitan area. Market-basket costs were also estimated by community health nurses in community stores.	Geographical remoteness	freight funded through an increase in the price of cigarettes. A market basket was up to 45% more expensive in community run stores in remote areas than metropolitan areas.	-	Indexation	Not reported
Food security, remoteness and consolidation of	Singh-Peterson et al., 2016	Quantitative	Random	Use of data from the Queensland Food Access Basket Study. Distance to distribution centres and urban centres, and types of	Geographical remoteness Type of store	Direct distance to Brisbane (capital city) is positively	Transport costs and high fuel costs Distance from food	Structural shifts in supermarket distribution policies need to consider relative positioning of food	Not reported

Article	Author, Publication Year	Study design	Sampling	Method description	Results - determinants	Outcomes	Author commentary on determinants	Implications for policy/practice	Limitations (as reported)
supermarket distribution centres: Factors contributing to food pricing inequalities across Queensland, Australia ⁵¹				transportation was considered. Remoteness data were assessed using ARIA and the SEIFA index of disadvantage. Spatial econometric modelling techniques were used to assess the influence of potential determinants of food basket prices.		and significantly correlated with food basket prices. Store type is significantly and negatively correlated with store prices, indicating that food purchased in supermarkets is less expensive than food purchased in speciality and independent stores.	distribution centres Lack of large supermarkets Store buying power	distribution centres, increasing fuel prices and the ongoing impact of supermarket centralisation policies as systemic issues Policies to address the relationship between location of distribution centres and the length of the dominant supermarket-driven food supply chain. Exposure and vulnerability of a centralised food distribution system in the era of climate change warrants urgent attention. Strengthen a combination of both supermarket-driven and local food supply chains in order to increase food security, and supply chain resilience in rural and remote locations. Support local capacity building and uptake of technology for communities to produce more food	

Article	Author, Publication Year	Study design	Sampling	Method description	Results - determinants	Outcomes	Author commentary on determinants	Implications for policy/practice	Limitations (as reported)
The socio-economic and physical contributors to food insecurity in a rural community⁵⁷	Le et al., 2015	Mixed methods	random	Self-administered survey with questions addressing demographics, food access, availability, affordability and food awareness was distributed at post offices and centres. Descriptive statistical analysis was completed. Focus groups conducted with discussions around food, food availability, and barriers/enablers to food security in the community. Discussions were transcribed and underwent thematic analysis to identify key patterns and trends.	Food origin	Local food is exported to other states and sold at cheaper prices than is available where the food is grown.	Global economic downturn	and become more self-reliant. Formulation and implementation of policy to effect significant change to the present food system is needed. Move from individual to population health to address the social determinants of health. consider policy alternatives with an equity focus.	Not reported
Food costs and nutrition in remote areas.⁵²	Gracey et al., 1991	Quantitative	purposive	Use of the Kimberley Market Basket Survey	Geographical remoteness	The cost of the basket was at least 100% in all remote localities relative to the capital city throughout the study. The price differential has fallen		Mechanisms to increase food affordability in remote areas	Not reported

Article	Author, Publication Year	Study design	Sampling	Method description	Results - determinants	Outcomes	Author commentary on determinants	Implications for policy/practice	Limitations (as reported)
---------	--------------------------	--------------	----------	--------------------	------------------------	----------	-----------------------------------	----------------------------------	---------------------------

progressively from 130% in 1986 to 110% in 1990 between very remote and metropolitan areas.

SA; South Australia, ASAP; Australian Standardised Affordability and Pricing, QLD; Queensland, SA2; Statistical Area Level 2, SEIFA; Socio-economic Indexes for Areas, NEMS-S; Nutrition Environment Measures Survey in stores, NEMS-R; Nutrition Environment Measures Survey in restaurants, LGA; Local Government Area, NT; Northern Territory, APY; Anangu Pitjantjatjara Yankunytjatjara, RIST; Remote Indigenous Stores and Takeaways, CPI; Consumer Price Index, HFAB; Healthy Food Access Basket, SPSS; Statistical Program for Social Sciences, ARIA; Accessibility/Remoteness Index of Australia.