

Improving the fresh fruit and vegetable supply in rural Australia: A systematic scoping review of interventions

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Abstract

Objective: Fresh fruits and vegetables are integral to a healthy and sustainable diet. However, fresh produce is inequitably more expensive, less available and of poorer quality in rural Australia, compared with that of metropolitan locations. Reasons include costs associated with transporting food long distances and reduced competition. We aimed to identify interventions or proposals to improve the supply of fresh fruit and vegetables in rural Australia.

Methods: Using a systematic scoping review, we searched peer-reviewed databases, web searches and the Australian Indigenous HealthInfoNet in August 2022.

Results: Shortening food supply chains (e.g. food hubs) was the most frequent recommendation to improve both the efficiency and resilience of the food supply chain (n=17), followed by improving freight processes (e.g. creating local buying groups; n=6) and promoting the role of governments (e.g. linking government departments with local interest holders; n=5). Only six of the 37 interventions have been implemented. Critical analysis of the interventions was limited, with only one intervention having been evaluated.

Conclusions: The interventions identified could facilitate increased intake of fresh fruit and vegetables in rural locations in Australia, contributing to a reduction in diet-related chronic disease.

Key words: food supply chain, fruit, vegetables, food distribution, rural, Australia

Introduction

Diets with inadequate quantities of fruits and vegetables (defined by the World Health Organization as <400g/day¹) are associated with cancer, heart disease, type-two diabetes, and overall mortality.² Moreover, diets rich in fruits and vegetables have the smallest environmental footprint of any dietary pattern.³ However, in Australia, only 6% of adults and 8% of children meet national recommendations (1–2 fruit and 4–6 vegetable serves each day).⁴ Fruit and vegetable consumption is, in part, impacted by factors outside individual control, including their availability, quality and cost.^{5,6}

Rural and remote areas of Australia, compared to metropolitan settings, face higher prices,^{7–10} limited availability and poorer quality of fruits and vegetables, negatively impacting consumption.¹¹ For example, a basket of healthy food costs between 31% and 52% more in remote locations as compared with metropolitan locations in Australia.^{7,12–14} The cost of food is higher for rural and remote

populations, both in terms of the dollar value of food products and the cost of food as a proportion of income, further exacerbated by lower-than-average wages in rural settings.^{15,16} While these communities are consistently paying more for fresh fruit and vegetables, these items are more likely to be less available and of a poorer quality as compared with metropolitan locations.^{17,18} This has been demonstrated in rural Victoria,¹⁸ though in contrast, some stores in the Northern Territory report consistent availability and quality.^{7,19} However, this reporting has been conducted during the dry season²⁰ and, therefore, do not necessarily reflect the cost, availability and quality of fresh fruit and vegetables when weather and transport conditions can be compromised.^{21,22}

Contributing factors to this inequitable access to affordable, acceptable fresh fruits and vegetables include the consolidation of supermarket distribution centres in metropolitan cities, geographic remoteness, difficult terrain and the need for multiple modes of transportation to move food from farm to fork.^{23–25} For example, the

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road, rail or sea infrastructure used for transporting food may be in poor condition or can be interrupted at certain times of the year (i.e. during the 'wet season' in northern Australia when monsoonal rains, flooding and cyclones occur) resulting in delayed distribution and increased costs for petrol and refrigeration.^{21,22} Difficulties transporting food can contribute to infrequent deliveries, resulting in limited availability and a lengthy freight process also affecting quality.^{21,26,27} Furthermore, smaller population sizes create less demand for goods and services, resulting in fewer retail outlets.¹¹ This is further compounded by residents 'out-shopping' (where people travel to cities or other towns to purchase food).^{18,28} These barriers to accessibility to fresh produce contribute to reduced rates of consumption²⁹ and associated inequitable burden of diet-related chronic diseases for rural Australians.^{30,31}

Though the literature exists examining interventions that target retail stores or consumers to increase demand for fresh fruit and vegetables in Australia,^{32–37} initiatives to improve 'supply-side' factors that influence fruit and vegetable intake in rural communities are lacking.³⁸ Select government policy documents and inquiries have been initiated at both Federal and State levels,^{39–42} with suggested interventions including improving remote retail operations, providing subsidies to reduce the cost of 'essential' food and grocery items and improving dry and refrigerated stock storage capacities, though this has not yet resulted in meaningful action or tangible outcomes. Food systems and food supply chains are key drivers of dietary intakes, hence the importance of addressing these at a broader level.⁴³ Thus, the aim of this review is to examine current interventions and proposals to improve the supply of fresh fruit and vegetables in rural Australia. In addressing this aim, we will answer the following research questions:

1. What interventions have been implemented or proposed to improve the supply of fresh fruit and vegetables in rural and remote locations in Australia, which focus on the storage and processing, packaging and distribution and freight and transport steps of the food supply chain?
2. What are the advantages of these interventions and proposals, as well as any challenges and barriers for implementation?

Materials and methods

The literature on the supply of fresh fruit and vegetables in rural and remote locations in Australia is published in a variety of academic and grey literature sources and is an evolving research area given the ongoing supply chain disruptions caused by the COVID-19 pandemic, natural disasters and global conflicts. Given these circumstances, a systematic scoping review was considered more appropriate than a traditional systematic literature review.^{44,45} The protocol for this review was adapted from the JBI Manual for Evidence Synthesis,⁴⁶ and reporting conforms to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines for systematic scoping reviews.⁴⁷ In this review, we focus on the storage and processing, packaging and distribution and freight and transport steps of the food supply chain (Figure 1⁴⁸). Improvement in the supply of fresh fruit and vegetables is defined for the purposes of this review as reported reduced cost, increased availability or improved quality of fresh produce.

Study selection criteria

Table 1 shows the inclusion and exclusion criteria used to determine relevance of peer-reviewed and grey literature. To capture a broad range of the literature, no limits were applied regarding date or type of publication. Classification of geographic remoteness was based on the Australian Institute of Health and Welfare description of rural and remote as "all areas outside Australia's major cities," further classified by the Australian Standard Geographical Classification System from the Australian Bureau of Statistics where a location was specified (defined in Table 1).⁴⁹ If the location was not explicitly stated, remoteness was defined by the terms used in each piece of the literature.^{50,51} Records were included if a clear focus on rural or remote locations of Australia could be identified from the text. Interventions or proposals that addressed disruptions to the food supply chain caused by a major event, such as flooding or the COVID-19 pandemic, were only eligible for inclusion if it was clear that any improvements to the supply of fresh fruits and vegetables could continue long-term, after the disruption had ceased. Interventions were considered short-term if they were one-off actions or aimed only to provide immediate relief for fruit and vegetable access. Interventions that may be considered short or long term were discussed by all authors, with consensus reached in all instances.

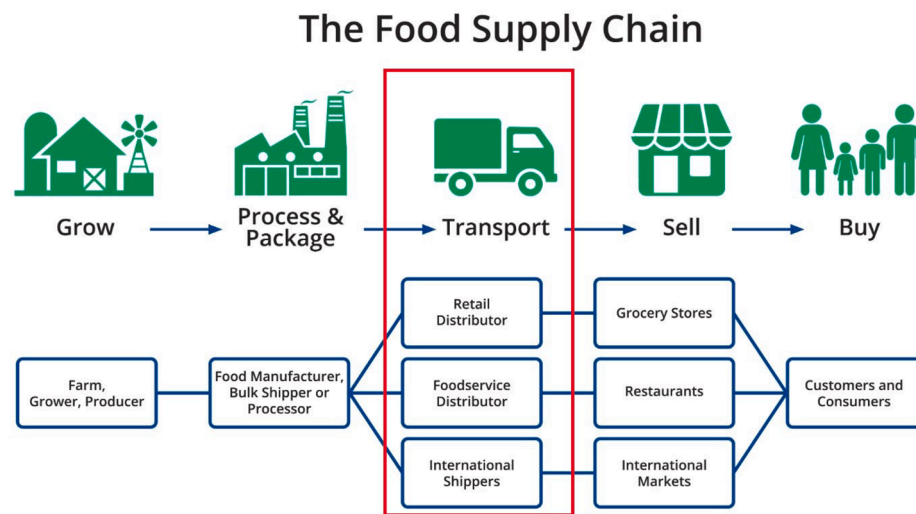
Peer-reviewed literature search strategy

The *Scopus*, *PubMed*, *Science Direct*, *Web of Science*, *Wiley*, *CINAHL*, *Sociological Abstracts* and *Embase* peer-reviewed databases were searched in August 2022 using the following search terms: (food OR fruit* OR vegetable*) AND (Australia OR Queensland OR "New South Wales" OR "Australian Capital Territory" OR Victoria OR "South Australia" OR "Western Australia" OR "Northern Territory" OR Tasmania) AND (region* OR rural OR remote).

All searches were restricted to title, abstract and keywords only, and subject headings such as MESH and Emtree were used where available. Relevant articles were saved in EndNote X9.3.3⁵² and then uploaded to Covidence⁵³ to manage the screening process. Peer-reviewed literature was screened in two stages by the lead author based on the inclusion and exclusion criteria. The title and abstract were screened for all records, followed by screening of full text for those records identified as being potentially relevant. In addition, 20% of full text records were also screened by the senior author with agreement of 94%. Disagreements about inclusion and exclusion were discussed with the research team until consensus was reached.

Grey literature search strategy

In addition, systematic searches were also conducted in August 2022 to identify relevant grey literature using a published protocol to guide this process, including government and non-government organisation reports, policy documents, and community activity records.⁵⁴ Seven searches were conducted using the Google search engine and Firefox web browser, with region restricted to Australia. Details of these Google searches can be found in Supplementary Table 1. As Google searches are ranked by relevancy, only the first 100 results for each search were bookmarked for review.⁵⁴ The cost, quantity and quality of fresh fruit and vegetables in remote Aboriginal and Torres Strait Islander Communities in Australia is a long-standing issue.^{21,55–57} To ensure this research was captured,

Figure 1: A diagram of the food supply chain.⁴⁸

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

Table 1: Inclusion and exclusion criteria.

	Inclusion criteria	Exclusion criteria
Full text available	Record is available in full text	Full text is not available
Language	Record is available in English	Record is only available in a language other than English
Record version	Record is the most current version referring to this intervention or proposal	There is a more up-to-date or relevant record referring to this intervention or proposal
Type of intervention	Intervention or proposal is about a relevant part of the food supply chain (storage and processing, packaging and distribution or freight and transport) Aim of the intervention or proposal is to improve the supply of fresh fruit and vegetables in one or more of these ways: - Reduced cost for the consumer - Increased quantity available for purchase at retail outlets - Improved quality of the produce available for purchase at retail outlets (e.g. fresher, less blemishes, damage)	Intervention or proposal is not about a relevant part of the food supply chain or the aim does not relate to one or more of the outcomes of interest
Content of intervention	Relevant interventions or proposals include policy, legislation, subsidy, program, project, initiative, service, strategy, etc. from industry or government. The record could refer to a proposal for an intervention rather than an intervention that has been implemented, but it must provide a sufficient level of detail and clearly link the proposal to a relevant outcome (reduced cost, increased quantity or increased quality of fresh fruit and vegetables)	Record does not include a sufficient level of detail about the intervention or proposal, or it is not clearly linked to a relevant outcome
Relevance to rural or remote locations in Australia	Intervention or proposal is focused on a rural or remote location of Australia (categorised by the Australian Bureau of Statistics as <i>Inner regional</i> , <i>Outer regional</i> , <i>Remote</i> or <i>Very remote</i>) ⁴⁹	Intervention or proposal is not focused on Australia or is focused on metropolitan locations in Australia only

grey literature searches were also conducted in the Australian Indigenous HealthInfoNet research repository.⁵⁸ The following search terms were applied using the “title or description” search – “food AND supply,” “food AND freight” and “fruit OR vegetable”. Only results tagged as “publications,” “resources,” “policies” and “programs” were reviewed, and peer-reviewed literature was excluded as this was captured by the separate peer-reviewed literature search strategy. To the authors’ knowledge, a similar grey literature database does not exist for research on this topic for non-Indigenous Australians. [Supplementary Table 2](#) details the searches conducted in Australian Indigenous HealthInfoNet.

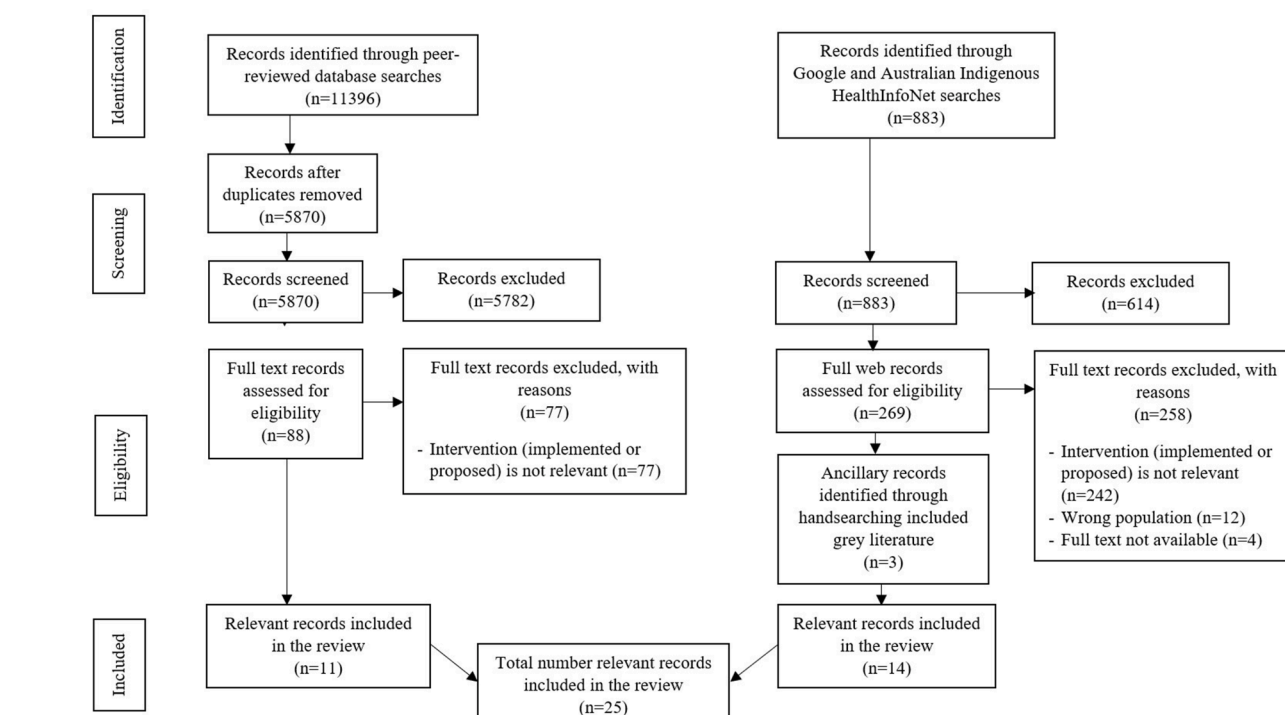
Relevant documents were saved to Microsoft Excel (version 2209). The lead author screened the grey literature in two stages based on the inclusion and exclusion criteria. First, the title was reviewed, and

webpage or document was scanned to determine relevance. The full text of potentially relevant records was then screened more thoroughly, either by downloading a Word document or portable document format, if available, or reviewing the webpage. In addition, the senior author screened 20% of full text records, with 95% agreement. Disagreements about inclusion or exclusion were discussed with the research team until consensus was reached. A further n=3 eligible records were identified by hand-searching. [Figure 2](#) shows the full search strategy and results obtained.

Data extraction and analysis

A data extraction spreadsheet was developed in Excel. Fields extracted included citation details (author/s, title and year published), the location [inner regional, outer regional (classified together as

Figure 2: PRISMA flow diagram describing record inclusion and exclusion at each stage of the study selection process.



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

regional) or remote or very remote (classified together as remote), along with state/territory and city/town/local government area if available], whether the publication was reporting an intervention that had been conducted or listing one or more proposals, the step/s of the food supply chain targeted by the intervention or proposal (storage and processing, packaging and distribution and freight and transport), the outcome/s targeted (reduced cost, increased quantity or improved quality) and how the intervention/proposal may improve the food supply chain. Data from the included records (both peer-reviewed and grey literature) were then extracted into the relevant categories by the lead author. Full details of the included

records can be found in [Supplementary Tables 3 and 4](#). A formal quality assessment of records selected for inclusion in the review was not undertaken as is typical for systematic scoping reviews, and also in line with the purpose of the review which was to examine a gap in the literature rather than the quality of evidence available on this topic.^{59,60}

The data extracted from the included records were analysed using an abductive process,⁶¹ that is, the results were informed both by concepts derived from an examination of previous literature published on this topic as well as by concepts identified during the

Table 2: Description of intervention and proposal categories and improvements to the food supply chain.

Categories	Description
Types of interventions and proposals	
Short food supply chain	A type of food supply chain that aims to achieve the closest possible distance between a producer and a consumer in terms of geography and/or number of intermediaries, however there is currently no precise definition of what constitutes a short food supply chain ⁶²
Improvements to freight processes	Improvements to the logistical and administrative processes involved with moving food from one place to another, such as packaging and storage, consolidation of loads, choice of route and cold chain management ^{24,27}
Improvements to transportation infrastructure	Upgrading, expanding or building new road, rail, air or sea infrastructure for the transportation of food ²⁴
Promoting the role of government	The actions that Australian national, state/territory and local governments can take to improve the supply of fresh fruit and vegetables in rural and remote locations ¹¹
Addressing market power	The opportunities that larger supermarket retailers in Australia have for purchasing at scale, negotiating for lower freight costs and promotional pricing, which allow them to sell food at lower prices and with increased availability as compared to smaller, independent retailers ^{21,26,63}
Improvements to characteristics of the food supply chain	
Efficiency	An efficient food supply chain does more with less and maximises outputs with the smallest amount of inputs ⁶⁴
Responsiveness	A responsive (sometimes referred to as effective) food supply chain is able to quickly adapt to the needs or preferences of consumers ⁶⁵
Resiliency	A resilient food supply chain is able to bounce back or adapt in the face of a shock or stressor ⁶⁶
Sustainability	A sustainable food system (of which the food supply chain is part) is able to deliver adequate nutrition for all while sustaining the livelihoods of those who work in the food system and without compromising the ability of future generations to grow and eat food ⁶⁷

data analysis process. Table 2 presents a description of the categories of interventions and proposals identified in the included articles, along with the terms used in this review to describe improvements to the food supply chain.

Results

Overview of interventions

Twenty-five records (11 peer-reviewed and 14 grey literature) were included in the review,^{11,18,21,25–27,57,68–85} covering six implemented interventions and 31 proposals for interventions (hereby referred to collectively as interventions). Records included in the review were published between 2001 and 2022 and covered a range of Australian jurisdictions, including a national focus or addressing multiple jurisdictions (n=9); Victoria (n=6); Northern Territory (n=3); Queensland (n=2); Western Australia (n=2); New South Wales (n=1); South Australia (n=1) and Tasmania (n=1). The grey literature records included five not-for-profit organisation reports, three national government policy documents, three state government policy documents, two local council documents and one peak industry body report.

Table 3 depicts a summary of the aims, intended improvement and location of each intervention. Aims of the interventions and proposals included increasing the quantity (n=36), improving the quality (n=29), and reducing the cost (n=28) of fresh fruit and vegetables available in rural or remote locations. Intended improvements to specific characteristics of the food supply included efficiency (n=27); resilience (n=19); sustainability (n=12) and responsiveness (n=8; defined in Table 2). Most interventions were categorised as shortening food supply chains (n=17), followed by improvements to freight processes (n=9), promoting the role of government (n=5), improvements to transportation infrastructure (n=4), and addressing market power (n=2). Most interventions targeted regional locations only (n=17), followed by those focused on both types of locations (i.e. regional and remote; n=13), while only seven were set in remote locations only. Only one intervention was subject to an evaluation, though some records included a brief discussion of related challenges or barriers. However, then specific effect on the cost, quantity and quality of fresh fruit and vegetables for consumers from this evaluation was unclear as the article included in the review was a summary report as original source could not be located.⁷⁹

Intervention types

i. Short food supply chains

Interventions to shorten food supply chains aimed to achieve the closest possible physical distance between the producer and consumer to improve both the quantity (addressed by n=16 interventions) and quality of fresh fruit and vegetables available in rural and remote locations while reducing cost (n=11). In addition, short food supply chains were most frequently considered to improve the resiliency of the food supply chain (in n=14 interventions), followed by sustainability (n=10), efficiency (n=9) and responsiveness (n=6). These types of interventions mostly targeted regional locations (n=12), with a smaller number of interventions discussing both location types (n=4) or remote locations only (n=1).

Several specific interventions to shorten the food supply were suggested. This included the following: i) cooperation among food supply stakeholders through formal or informal communication networks, such as e-commerce platforms, to facilitate distribution of locally grown food (n=5)^{72,74,75,77,82}; ii) food hubs,^{68,73,78,80} described as social businesses designed to expand market access for small- and medium-sized producers through coordinating the movement and exchange of produce (n=4)⁷³; and iii) selling locally grown fresh fruit and vegetables that are second grade at a lower cost as long as any reduction in quality or shelf life is clearly marked (n=1).⁷⁰

Some records discussed the benefits of short food supply chains in terms of their ability to deal with stressors such as major flooding or the COVID-19 pandemic.^{25,71,72,74,76,84} However, critical analysis of strengths, weaknesses, opportunities and barriers of interventions to shorten supply chains was otherwise limited.

ii. Improvements to freight processes

Records often described that improving freight processes could improve all three food supply outcomes (n=9 for cost, quantity and quality). Improvements to the efficiency of the food supply chain (n=9) were discussed more often than resiliency (n=2), sustainability (n=1) or responsiveness (n=0). Interventions and proposals in this category were often set in both location types (n=5), rather than exclusively in remote (n=3) or regional (n=1) locations.

Table 3: Summary of the number of interventions and proposals in each category (n=37).

		Types of interventions					Total
		Short food supply chains	Freight processes	Transportation infrastructure	Role of government	Market power	
Effect on fresh fruit and vegetable supply	Cost	11	9	3	4	1	28
	Quantity	16	9	4	5	2	36
	Quality	11	9	4	4	1	29
Food supply chain improvement	Efficiency	9	9	4	5	0	27
	Responsiveness	6	0	0	0	2	8
	Resiliency	14	2	3	0	0	19
	Sustainability	10	1	0	0	1	12
Location	Regional only	12	1	1	1	2	17
	Remote only	1	3	2	1	0	7
	Multiple	4	5	1	3	0	13

Specific interventions described to improve freight processes included the following: i) cooperation among food supply stakeholders to initiate buying groups, where several retailers collaborate to negotiate lower freight costs ($n=4$)^{18,26,81,85}; ii) freight improvement studies, sometimes conducted using freight groupage software, which involve measuring requirements and then identifying the most efficient freight options ($n=3$)^{27,79,81}; and increased delivery schedules (weekly instead of fortnightly), minimising the time taken to move food from the delivery destination (in this case a barge) to the retailer, particularly for remote Aboriginal and Torres Strait Islander communities ($n=1$).⁶⁹ There was no evaluation or critical analysis of the interventions in the included records.

iii. Improvements to transportation infrastructure

The interventions and proposals in this category most frequently indicated that improving transportation infrastructure could improve the quantity and quality of fresh fruit and vegetables available in rural and remote locations ($n=4$), followed by a reduction in cost ($n=3$). In addition, improving transportation infrastructure was most frequently considered to improve the efficiency ($n=4$) and resiliency ($n=3$) of the food supply chain, with responsiveness and sustainability not discussed. Finally, improvements to transportation infrastructure were discussed in relation to remote locations ($n=2$), with fewer records referring to both location types ($n=1$) or regional locations only ($n=1$).

Specific interventions described to improve transportation infrastructure included the following: i) transferring from a reliance on road infrastructure to more usage of rail for transporting food around Australia ($n=2$)^{74,83}; ii) upgraded shipping lanes in the Torres Strait and the coastal regions of the Northern Territory, as well as road infrastructure for remote communities ($n=1$)²¹; and advocacy by remote Aboriginal and Torres Strait Islander communities for improved road infrastructure to avoid road closure during the wet season with its resulting increase in the cost of food ($n=1$).⁶⁹ There was no evaluation or critical analysis of the interventions in the included records.

iv. Promoting the role of government

Interventions that addressed the role of government often discussed how government action could improve the quantity of fresh fruit and vegetables available in rural and remote locations ($n=5$), followed by improving the quality and reducing the cost ($n=4$). In addition, government actions were only discussed in terms of their propensity to improve the efficiency of the food supply chain ($n=5$), with responsiveness, resiliency and sustainability not linked by records to this type of intervention or proposal. Government actions were most often discussed in the context of both location types ($n=3$), with fewer interventions referring to regional or remote locations only ($n=1$, respectively).

Two proposals called for collaboration between the multiple government departments and agencies involved with the food supply,^{11,81} and also the necessity for a National Food Security Strategy.¹¹ As part of the COVID-19 pandemic response, a food security working group was tasked with investigating food supply issues for remote Aboriginal and Torres Strait Islander communities,

with one proposal suggesting that this should be maintained long-term.²¹ Finally, two proposals highlighted how local governments could develop and manage networks to link local producers together to facilitate distribution of locally grown food, acknowledging that producers might struggle to do this themselves.^{72,77} There was no evaluation or critical analysis of the interventions in the included records.

v. Addressing market power

Interventions in this category most frequently described how addressing market power could improve the quantity of fresh fruit and vegetables available in rural or remote locations ($n=2$) followed by quality and cost ($n=1$). Addressing market power was considered most likely to improve the responsiveness ($n=2$) and sustainability ($n=1$) of the food supply chain, whereas efficiency and resiliency were not discussed. The interventions and proposals that reported on market power referred to regional locations only ($n=2$).

One proposal was for the introduction of government regulation to increase the decision-making power of smaller retailers and their ability to influence the food supply.⁷⁶ Another proposal suggested implementation of a central market system, whereby all retailers, including larger ones, would be required to procure produce from the central market rather than via individual contracts with producers.⁷⁴ It was indicated that this would be beneficial for producers as it would give them more power to negotiate a better deal; however, the possible impact on the cost of food for consumers was not discussed.⁷⁴ There was no evaluation or critical analysis of the interventions in the included records.

Discussion

This systematic scoping review identified existing interventions and proposals to improve the supply of fresh fruit and vegetables in rural and remote locations in Australia, focussing on the storage and processing, packaging and distribution, and freight and transport steps of the food supply chain. Although food systems experts acknowledge the importance of supply in encouraging increased intake of fruit and vegetables,³² previous research has found that 'supply-side' interventions are often overlooked in favour of those focused on increasing demand.³³ In line with this, few records were found that addressed this important issue, with the most reporting proposals for hypothetical actions rather than detailing or evaluating interventions that had been implemented. One reason for this finding may be the challenges posed by collaboration among the diverse array of stakeholders (producers, distributors, retailers, among others) involved with the food supply.³² It is also possible that those involved in such interventions are primarily focused on the practical implementation of the work, rather than documenting and publishing their findings. We also acknowledge that for those in remote and very remote settings, consuming some nonperishable (i.e. canned, frozen) vegetables may be a necessity due to access and freight issues.

Short food supply chains were the most frequently reported intervention or proposal in the literature. Several records examined how the resilience of short food supply chains allowed food supply stakeholders in rural and remote locations in Australia to successfully adjust to the supply chain disruptions associated with the COVID-19

pandemic.^{71,72,76,84} Supply chain disruptions are not only an issue in Australia, they affect countries globally.^{86–88} As a result, many countries are now seeking to develop and expand local food supply systems to reduce reliance on global food supply chains and boost the resilience of the food supply to shocks and stressors. Previous research conducted after major flooding in one state of Australia identified that the presence of certain elements, such as diversity and flexibility, may be more important to the resilience of a food supply chain than the simple short-long dichotomy.⁸⁹

For the rural Australian context, short food supply chains may not be sufficient to improve the supply of fresh fruit and vegetables. For example, Singh-Peterson et al. commented on the substantial market power of major Australian supermarket chains, which may encourage subsequent lower prices and greater availability of produce in rural settings.²⁵ However, relying on the supermarket duopoly of giants in Australia, who account for up to 80% of sales in dry groceries, is problematic.⁹⁰ With one of the most highly concentrated markets in the world, Australian supermarkets have used this power to apply 'unfair' penalties for farmers and suppliers,⁹¹ increase prices on basic food items higher than the average national inflation rate,⁹² and limit competition from smaller, independent retailers.⁹³ Some records in this review highlighted how the power of major Australian wholesalers and supermarket retailers to influence the supply of fresh fruit and vegetables in rural and remote locations is unlikely to be addressed without government action.^{11,21,74,76} Government regulation of supermarket competition has taken place in the United Kingdom,⁹⁴ and also been recommended in New Zealand, where residents in rural and remote locations face similar food supply challenges to those in Australia.⁹⁵ In Australia, several policies have been proposed to address the market power of Australia's two prominent grocery chains, particularly in the Australian Competition and Consumer Commission Supermarket Inquiry 2024–2025.⁹⁶ These include divestiture powers for the Australian Competition and Consumer Commission, mandatory food and grocery codes of conduct that limit unfair supply chain practices, and improved transparency of pricing practices.^{96,97} However, negligible legal interventions have been sanctioned.

Most interventions and proposals included in this review were intended to address all three outcomes of reduced cost, increased quantity, and improved quality of fresh fruit and vegetables in rural and remote locations. As food systems are interconnected, each successive step of the food supply chain is impacted by the previous steps.⁹⁸ This means that challenges such as geographic remoteness affect the food supply in multiple ways and issues with the cost, quantity and quality of fresh fruit and vegetables therefore frequently occur together. This is exemplified by the long-standing, systemic issues with the food supply experienced by remote Aboriginal and Torres Strait Islander communities⁹⁹ that were highlighted by several records included in this review.^{21,27,57,81} Similar results are found in rural locations in the United States of America,^{100–102} where, like Australia, food frequently travels long distances to reach its destination with this resulting in vulnerabilities within the food supply chain.¹⁰³

Food supply vulnerabilities were frequently mentioned in the documents included in this review highlighting the complexity of food systems where the retail pricing of food is dependent on a wide range of factors such as farm production, international trade, marketing and retail strategies and consumer preferences, among

others.¹⁰⁴ In line with this, a subset of records in this review addressed the quantity and quality of fresh fruit and vegetables available to consumers in rural and remote locations, but only discussed cost in terms of economic viability for producers.^{68,73,74,78} This is also related to wider discussions about whether the affordability of food is a task for the food system or whether it is a task for governments (e.g. via economic policies and/or social protection programs).¹⁰⁵

Efficiency was the most frequent food supply chain improvement described by the interventions and proposals in this review. Although improving efficiency is often seen as an opportunity to reduce costs and maximise profits,¹⁰⁶ it was generally not clear from the included records how the supply chain improvements they described would result in an improvement to the cost of food for consumers. For example, several records proposed freight buying groups as an opportunity for improving the efficiency of freight processes,^{18,26,81,85} and freight buying groups that already operate in remote Aboriginal and Torres Strait Islander communities were also described, with anecdotal reports of positive results in regard to a reduction in freight costs.^{26,81}

While some interventions or proposals were broadly relevant to rural and remote locations, food hubs were commonly utilised or proposed for regional areas only.^{68,73,78,80} This is because, to maximise the chances of financial viability, a food hub ideally needs to be located no further than 50–80 kilometres from a town with a minimum population of 30,000 residents.⁷³ This then increases the likelihood of acquiring start-up funding, large contracts from businesses or institutions, community engagement and a supportive local government.⁷³ However, this population size is unlikely to be found in, or near, rural and remote locations in Australia, where towns may have only several hundred residents.^{18,21} Even with many of these factors in place, a food hub may still not be able to reach financial viability as demonstrated by the South East Food Hub.⁸⁰ In addition, the impact of food hubs on the affordability of fresh fruit and vegetables for residents of rural and remote locations is less clear than their impact on quantity and quality.⁷⁸

This systematic scoping review of interventions to improve the supply of fresh fruit and vegetables in rural and remote locations of Australia found a limited number of records reporting on this issue, with most reporting proposals rather than interventions that had been implemented. Despite their limited number, these proposals could usefully inform the development of national food security strategies, including the National Strategy for Food Security in Remote First Nations Communities,¹⁰⁷ and to guide the efforts of the various stakeholder groups involved in improving the food supply for rural and remote locations in Australia. However, of the five records that reported interventions, only one included an evaluation, with the effect on the cost, quantity and quality of fresh fruit and vegetables for consumers unclear.⁷⁹ Without a comprehensive evaluation, it is difficult to identify potential improvements or unintended consequences, leaving gaps in both knowledge and practice. Evidence of effectiveness is needed to adequately inform policy; therefore, future research should investigate implementation of the proposals included in this review and ensure that this includes measurement of the cost, quantity and quality of fresh fruit and vegetables for consumers and an evaluation of improvements in these outcomes over time. The results of this systematic scoping review identify opportunities for improving the supply of fresh fruit

and vegetables in rural and remote locations. This would likely lead to increased intake of fresh fruit and vegetables, with a potential positive impact on health, such as reducing rates of diet-related chronic disease in these locations.³⁸ In addition, this would also reduce the inequity experienced by people living in these locations and increase the sustainability of the Australian food system.⁶⁷

Strengths and limitations

To the best of the authors' knowledge, this is the first study to systematically examine existing interventions and proposals to improve the food supply for rural and remote locations in Australia. This is an important area of research that, to date, has been inadequately examined and underfunded. Another strength of this systematic scoping review is that it included both peer-reviewed and grey literature, resulting in the inclusion of a wider variety of interventions and proposals, such as those published by Australian federal, state/territory or local governments and non-government organisations. These sources helped to provide contextual information about the topic that may have otherwise remained uncovered.¹⁰⁸ However, this study is not without limitations. First, although deliberate to capture as much literature as possible, an appraisal of the quality of the records included in the review was not undertaken.⁴⁶ Additionally, although systematic grey literature searches were conducted using the Google search engine and Australian Indigenous HealthInfoNet, other potential sources of relevant grey literature were not considered which may have resulted in the omission of potentially relevant records, including books or media articles. Additionally, future updates will be important as new evidence emerges.

Conclusion

This systematic scoping review of interventions or proposals to improve the supply of fresh fruit and vegetables in rural and remote locations in Australia identified five categories of results based on the role of the food supply chain—short food supply chains, improvements to transportation infrastructure, improvements to freight processes, the role of government and market power. All have the potential to make the food supply chain more efficient, more responsive, more resilient, and/or more sustainable. However, most interventions were only proposals, rather than implemented action, suggesting more attention and resources are needed to address the cost, quantity and quality of fresh fruit and vegetables in rural and remote locations in Australia to increase intake and, subsequently, improve the health and social equity of rural populations.

Conflicts of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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References

1. World Health Organization. *Healthy diet*. 2020. [https://www.who.int/news-room/fact-sheets/detail/healthy-diet#:~:text=At%20least%20400%20g%20\(i.e.,cassava%20and%20other%20starchy%20roots.](https://www.who.int/news-room/fact-sheets/detail/healthy-diet#:~:text=At%20least%20400%20g%20(i.e.,cassava%20and%20other%20starchy%20roots.) [Accessed 13 July 2022].
2. Yip CSC, Chan W, Fielding R. The associations of fruit and vegetable intakes with burden of diseases: a systematic review of meta-analyses. *J Acad Nutr Diet* 2019;119:464–81.
3. Baroni L, Cenci L, Tettamanti M, Berati M. Evaluating the environmental impact of various dietary patterns combined with different food production systems. *Eur J Clin Nutr* 2007;61:279–86.
4. Australian Bureau of Statistics. *Health conditions and risk: dietary behaviour*. Australian Bureau of Statistics; 2022.
5. Livingstone KM, Burton M, Brown AK, McNaughton SA. Exploring barriers to meeting recommendations for fruit and vegetable intake among adults in regional areas: a mixed-methods analysis of variations across socio-demographics. *Appetite* 2020;153:104750.
6. Wellard-Cole L, Watson WL, Hughes C et al. Perceptions of adequacy of fruit and vegetable intake as a barrier to increasing consumption. *Nutr Diet* [Internet]. Published online: 2022/05/03. doi: 10.1111/1747-0080.12735.
7. Northern Territory Government Department of Health. *2021 Northern Territory market basket survey - summary report* [Internet]. 2022. <https://data.nt.gov.au/dataset/nt-market-basket-survey-2021>. [Accessed 29 September 2022].
8. Pollard CM, Savage V, Landrigan T, Hanbury A, Kerr D. *Food access and cost survey* [Internet]. 2015. <https://www2.health.wa.gov.au/~media/Files/Corporate/Reports-and-publications/Chronic-Disease/Food-Access-and-Cost-Survey-Report-2013-Report.pdf>. [Accessed 3 October 2022].
9. Queensland Health. *2014 healthy food access basket survey* [Internet]. 2014. <https://www.health.qld.gov.au/research-reports/reports/public-health/food-nutrition/access/overview>. [Accessed 3 October 2022].
10. Love P, Whelan J, Bell C, Grainger F, Russell C, Lewis M, et al. Healthy diets in rural Victoria—Cheaper than unhealthy alternatives, yet unaffordable. *Int J Environ Res Publ Health* 2018;15:2469.
11. National Rural Health Alliance. *Food security and health in rural and remote Australia* [Internet]. 2016. <https://www.agrifutures.com.au/wp-content/uploads/publications/16-053.pdf>. [Accessed 26 September 2022].
12. Lee A, Patay D, Herron LM, Harrison EP, Lewis M. Affordability of current, and healthy, more equitable, sustainable diets by area of socioeconomic disadvantage and remoteness in Queensland: insights into food choice. *Int J Equity Health* 2021;20:153.
13. Lee AJ, Patay D, Summons S, Lewis M, Herron LM, Nona F, et al. Cost and affordability of healthy, equitable and more sustainable diets in the Torres Strait Islands. *Aust N Z J Publ Health* 2022;46:340–5.
14. Northern Territory Government. *NT market basket survey 2023* [Internet]. Northern Territory Government; 2024.
15. Russell C, Whelan J, Love P. Assessing the cost of healthy and unhealthy diets: a systematic review of methods. *Current Nutrition Reports* 2022;11:600–17.
16. Ho P. *Rural-urban wage differences in Australia: wage growth or wage level differences?*. 2023. Available at: SSRN 4453571.
17. Darcy M, Parkinson J, McDonald N, Moriarty S, Kadariya S, Sapkota D. Geographic remoteness and socioeconomic disadvantage reduce the supportiveness of food and physical activity environments in Australia. *Aust N Z J Publ Health* 2022;46:346–53.
18. Whelan J, Millar L, Bell C, Russell C, Grainger F, Allender S, et al. You can't find healthy food in the bush: poor accessibility, availability and adequacy of food in rural Australia. *Int J Environ Res Publ Health* 2018;15:2316.
19. Northern Territory Government Department of Health. *2021 Northern Territory market basket survey - data* [Internet]. 2022. <https://data.nt.gov.au/dataset/nt-market-basket-survey-2021>. [Accessed 29 September 2022].
20. Northern Territory Government Department of Health. *2019 NT Market basket survey* [Internet]. 2020. <https://data.nt.gov.au/dataset/nt-market-basket-survey-2019>. [Accessed 21 August 2022].
21. House of Representatives Standing Committee on Indigenous Affairs. *Report on food pricing and food security in remote Indigenous communities* [Internet]. 2020. https://www.aph.gov.au/Parliamentary_Business/Committees/House/Former_Committees/Indigenous_Affairs/Foodpricing/Report. [Accessed 21 August 2022].
22. Pollard C. Selecting interventions for food security in remote Indigenous communities. In: Farman-Bowers Q, Higgins V, Millar J, editors. *Food security in Australia: challenges and prospects for the future*. New York (NY): Springer; 2013. p. 97–112.

23. Bartos S. *Resilience in the Australian food supply chain* [Internet]. 2012. <https://www.tisn.gov.au/Documents/Resilience%20in%20the%20Australian%20food%20supply%20chain%20-%20PDF%20copy%20for%20web.PDF>. [Accessed 26 September 2022].
24. Keating A. Food security in Australia - the logistics of vulnerability. In: Farmer-Bowers Q, Higgins V, Millar J, editors. *Food security in Australia: challenges and prospects for the future*. New York (NY): Springer; 2013. p. 21–34.
25. Singh-Peterson L, Lieske S, Underhill SJR, Keys N. Food security, remoteness and consolidation of supermarket distribution centres: factors contributing to food pricing inequalities across Queensland, Australia. *Aust Geogr* 2016; 47:89–102.
26. Aboriginal Medical Services Alliance Northern Territory (AMSANT). *Food security in the Northern Territory - Consultation analysis and discussion paper* [Internet]. 2021. <http://www.amsant.org.au/wp-content/uploads/2021/05/NT-Food-security-consultation-results-and-discussion-paper.pdf>. [Accessed 26 September 2022].
27. Lovell I, National Rural Health Alliance. *Freight improvement toolkit: getting quality healthy food to remote Indigenous communities* [Internet]. 2007. https://healthinfonet.ecu.edu.au/healthinfonet/getContent.php?linkid=613836&title=Freight+improvement+toolkit+%282007%29&contentid=14880_1. [Accessed 26 September 2022].
28. Dangerfield F, Ball K, Dickson-Swift V, Thornton LE. Understanding regional food environments: a qualitative exploration of food purchasing behaviour. *Health Place* 2021;71:102652.
29. Carroll BT, McNaughton SA, Parker KE, Marchese LE, Livingstone KM. Identifying the barriers and facilitators to fruit and vegetable consumption in rural Australian adults: a mixed methods analysis. *Nutr J* 2024;23.
30. Australian Institute of Health and Welfare. *Aboriginal and Torres Strait Islander Health Performance Framework 2020 summary report* [Internet]. 2020. <https://www.indigenoushpf.gov.au/publications/hpf-summary-2020>. [Accessed 2 September 2022].
31. Australian Institute of Health and Welfare. *Rural and remote health* [Internet]. 2022. <https://www.aihw.gov.au/reports/rural-remote-australians/rural-and-remote-health>. [Accessed 2 September 2022].
32. Morgan EH, Worsley T. Expert perspectives on fruit and vegetable consumption in Australia. *Am J Health Promot* 2011;26:10–3.
33. Wolfenden L, Barnes C, Lane C, McCrabb S, Brown HM, Gerritsen S, et al. Consolidating evidence on the effectiveness of interventions promoting fruit and vegetable consumption: an umbrella review. *Int J Behav Nutr Phys Activ* 2021;18:11.
34. The Arnhem Land Progress Aboriginal Corporation (ALPA). *Health and nutrition strategy* [Internet]. 2022. <https://www.alpa.asn.au/health-and-nutrition>. [Accessed 30 September 2022].
35. Outback Stores. *Health and nutrition* [Internet]. 2022. <https://outbackstores.com.au/about/health-nutrition/>. [Accessed 30 September 2022].
36. Mai Wiru Regional Stores Council Aboriginal Corporation. *Choose life choose healthy* [Internet]. 2022. <https://maiwiru.org.au/>. [Accessed 30 September 2022].
37. Brimblecombe J, Ferguson M, Chatfield MD, Liberato SC, Gunther A, Ball K, et al. Effect of a price discount and consumer education strategy on food and beverage purchases in remote Indigenous Australia: a stepped-wedge randomised controlled trial. *Lancet Public Health* 2017;2:e82–95.
38. Australian Government Department of Health. *National preventive health strategy - 2021-2030* [Internet]. 2021. https://www.health.gov.au/sites/default/files/documents/2021/12/national-preventive-health-strategy-2021-2030_1.pdf. [Accessed 29 September 2022].
39. Australian Competition and Consumer Commission. *ACCC supermarkets inquiry 23 Marcus Clarke Street, Canberra, Australian Capital Territory, 2601 Australian competition and consumer Commission*. 2024.
40. 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* [HoRSCol Affairs, editor]. 2021.
41. Committee on Environment and Planning. *Food production and supply in NSW* [NPL Assembly, editor]. 2022.
42. Australian Government: National Indigenous Australians Agency. *National strategy for food security in remote Aboriginal and Torres Strait Islander communities*. 2025.
43. Pretorius B, Ambuko J, Papargyropoulou E, Schönfeldt HC. Guiding nutritious food choices and diets along food systems. *Sustainability* 2021;13:9501.
44. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Int J Soc Res Methodol* 2005;8:19–32.
45. Levac D, Colquhoun H, O'Brien KK. Scoping studies: advancing the methodology. *Implement Sci* 2010;5:69.
46. Aromataris E, Munn Z. *JBI manual for evidence synthesis* [Internet]. 2020. <https://synthesismanual.jbi.global>. [Accessed 26 September 2022].
47. Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. *Ann Intern Med* 2018;169:467–73.
48. Agricultural literacy curriculum matrix tracing the agricultural supply chain. <https://agclassroom.org/matrix/lesson/838/> (accessed September 23 2024).
49. Australian Institute of Health and Welfare. *Rural & remote Australians*. 2023. <https://www.aihw.gov.au/reports-data/population-groups/rural-remote-australians/links-other-information>. [Accessed 20 September 2024].
50. Australian Bureau of Statistics. *The Australian Statistical Geography Standard (ASGS) remoteness structure* [Internet]. 2016. <https://www.abs.gov.au/websitedbs/d3310114.nsf/home/remoteness+structure>. [Accessed 15 September 2022].
51. Australian Bureau of Statistics. *Data by region* [Internet]. 2020. <https://dbr.abs.gov.au/>. [Accessed 15 September 2022].
52. The EndNote Team. *EndNote*. X9 ed. Philadelphia (PA): Clarivate; 2013.
53. Veritas Health Innovation. *Covidence systematic review software*. Melbourne (AU): Veritas Health Innovation; 2022.
54. Godin K, Stapleton J, Kirkpatrick SI, Hanning RM, Leatherdale ST. Applying systematic review search methods to the grey literature: a case study examining guidelines for school-based breakfast programs in Canada. *Syst Rev* 2015; 4:138.
55. Australian National Audit Office. *Food security in remote Indigenous communities* [Internet]. 2014. https://www.anao.gov.au/sites/default/files/ANAO_Report_2014-2015_02.pdf. [Accessed 26 September 2022].
56. Council of Australian Governments. *National strategy for food security in remote Indigenous communities* [Internet]. 2009. <https://webarchive.nla.gov.au/awa/20130329094202/http://www.coag.gov.au/node/92>. [Accessed 26 September 2022].
57. House of Representatives Aboriginal and Torres Strait Islander Affairs Committee. *Everybody's business: Remote Aboriginal and Torres Strait community stores* [Internet]. 2009. https://www.aph.gov.au/parliamentary_business/committees/house_of_representatives_committees?url=atsia/communitystores/report/index.htm. [Accessed 16 September 2022].
58. Edith Cowan University. *Australian Indigenous HealthInfoNet* [Internet]. 2022. <https://healthinfonet.ecu.edu.au/>. [Accessed 15 September 2022].
59. Peters MD, Godfrey CM, Khalil H, McInerney P, Parker D, Soares CB. Guidance for conducting systematic scoping reviews. *Int J Evid Base Healthc* 2015; 13:141–6.
60. Munn Z, Peters MDJ, Stern C, Tufanaru C, McAurthur A, Aromataris E. Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. *BMC Med Res Methodol* 2018; 18:143.
61. Thompson J. A guide to abductive thematic analysis. *Qual Rep* 2022;27: 1410–21.
62. Renkema M, Hilletoft P. Intermediate short food supply chains: a systematic review. *BFJ* 2022;124:541–58.
63. Pollard CM, Landrigan TJ, Ellies PL, Kerr DA, Lester MLU, Goodchild SE. Geographic factors as determinants of food security: a Western Australian food pricing and quality study. *Asia Pac J Clin Nutr* 2014;23:703–13.
64. Mohan S, Gopalakrishnan M, Mizzi PJ. Improving the efficiency of a non-profit supply chain for the food insecure. *Int J Prod Econ* 2013;143:248–55.
65. Harrison A. Improving responsiveness in food supply chains. In: Mena C, Stevens G, editors. *Delivering performance in food supply chains*. Cambridge (UK): Woodhead Publishing; 2010.
66. Reis K, Desha C, Bailey M, et al. *Towards local food resilience - key considerations for building local food resilience and contingency plans: a focus on the Cairns region - final report* [Internet]. 2021. https://www.griffith.edu.au/__data/assets/pdf_file/0029/1334297/CRI-Towards-local-food-resilience-research-report.pdf. [Accessed 30 September 2022].
67. Food and Agriculture Organization of the United Nations (FAO). *Sustainable food systems - concept and framework* [Internet]. 2018. <https://www.fao.org/3/ca2079en/CA2079EN.pdf>. [Accessed 29 September 2022].
68. Ballantyne-Brodie E, Glover J. Convivial food systems design experimentation in regional communities: exploration of the Shepparton food system, regional Victoria, Australia. In: Massari S, editor. *Transdisciplinary case studies on design for food and sustainability*. London (UK): Woodhead Publishing; 2021. p. 41–57.
69. Brimblecombe J, Bailie R, van den Boogaard C, Wood B, Liberato SC, Ferguson M, et al. Feasibility of a novel participatory multi-sector continuous improvement approach to enhance food security in remote Indigenous Australian communities. *SSM Popul Health* 2017;3:566–76.
70. Godrich S, Kent K, Murray S, Auckland S, Lo J, Blekkenhorst L, et al. Australian consumer perceptions of regionally grown fruits and vegetables: importance, enablers, and barriers. *Int J Environ Res Publ Health* 2019;17:63.
71. Godrich SL, Lo J, Kent K, Macau F, Devine A. 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. *Nutr J* 2022; 21:17.
72. Godrich SL, Macau F, Kent K, Lo J, Devine A. Food supply impacts and solutions associated with the COVID-19 pandemic: a regional Australian case study. *Int J Environ Res Publ Health* 2022;19:4116.
73. Rose N. Community food hubs: an economic and social justice model for regional Australia? *Rur Soc* 2017;26:225–37.
74. Singh-Peterson L, Lawrence G. The changing face of the Mary Valley: considering the fairness, sustainability and resilience of the agricultural system in a peri-urban setting. *Local Environ* 2017;22:568–80.
75. Turner B, Pearson D, Dyball R. Planning for regional food security - a case-study of the Australian Capital Territory (ACT). *Locale* 2014;4:20–46.

76. Whelan J, Brown AD, Collier L, Strugnell C, Allender S, Alston L, et al. The impact of COVID-19 on rural food supply and demand in Australia: utilising group model building to identify retailer and customer perspectives. *Nutrients* 2021;13:417.
77. Auckland S, Murray S, Saunders C, King A. *Tasmanian local food supply project - final report* [Internet]. 2015. <https://www.healthyfoodaccess.tasmania.org.au/wp-content/uploads/2017/09/Tasmanian-local-food-supply-project.pdf>. [Accessed 26 September 2022].
78. City of Greater Bendigo. *Greater Bendigo food hub: a feasibility study for the establishment of a regional food hub in Bendigo: draft for community review* [Internet]. 2015. <https://www.bendigo.vic.gov.au/sites/default/files/2018-03/150828%20Bendigo%20Food%20Hub%20Feasibility%20Study%20Report.pdf>. [Accessed 26 September 2022].
79. Health and Community Services Workforce Council QLD. *Guide: an introduction to community development* [Internet]. 2013. https://www.checkup.org.au/icms_docs/182821_16_GUIDE_An_Introduction_to_Community_Development.pdf. [Accessed 26 September 2022].
80. Larsen K, Clarke J. *South East Food Hub: key lessons and recommendations from a food hub in Melbourne's south east* [Internet]. 2019. <https://about.openfoodnetwork.org.au/project/lessons-from-the-south-east-food-hub/>. [Accessed 26 September 2022].
81. Leonard D, North Australia Nutrition Group (NANG). *FoodNorth: food for health in north Australia* [Internet]. 2003. https://healthinonet.ecu.edu.au/healthinonet/getContent.php?linkid=8318&title=FoodNorth%3A+food+for+health+in+north+Australia&contentid=4053_1. [Accessed 26 September 2022].
82. North East Local Food Strategy Working Group. *North East local food strategy 2018-2022: strengthening the local food system in North East Victoria* [Internet]. 2019. https://www.gatewayhealth.org.au/wp-content/uploads/2021/08/NE_Local_Food_Strategy_2018_2022.pdf. [Accessed 26 September 2022].
83. NSW Council of Social Service (NCOSS). *Access to healthy food: NCOSS cost of living report* [Internet]. 2018. https://www.ncoss.org.au/wp-content/uploads/2018/09/2018-NCOSS-Cost-of-Living-Report_FINAL.pdf. [Accessed 26 September 2022].
84. NT Farmers Association. *Developing and expanding a Northern Territory fresh produce supply chain* [Internet]. 2020. https://ntrebound.nt.gov.au/_data/assets/pdf_file/0005/930029/7.-NTFA-Developing-Northern-Supply-Chain-Project-proposal-compressed.pdf. [Accessed 2 September 2022].
85. Strategic Inter-Governmental Nutrition Alliance. *National Aboriginal and Torres Strait Islander Nutrition Strategy and Action Plan 2000-2010 and first phase activities 2000-2003* [Internet]. 2001. <https://webarchive.nla.gov.au/awa/20031127033217/http://pandora.nla.gov.au/pan/49666/20050519-0000/www.nphg.gov.au/publications/signal/natsinsa1.pdf>. [Accessed 26 September 2022].
86. U.S. Department of Agriculture. *USDA announces framework for shoring up the food supply chain and transforming the food system to be fairer, more competitive, more resilient* [Internet]. 2022. <https://www.usda.gov/media/press-releases/2022/06/01/usda-announces-framework-shoring-food-supply-chain-and-transforming>. [Accessed 20 October 2022].
87. Ingram J, Andrews E. *Making community-scale food systems more resilient: reorienting consumption practices by supporting community-scale supply chain models* [Internet]. 2022. https://www.eci.ox.ac.uk/research/food/downloads/FSR-community-scale_FINAL.pdf. [Accessed 20 October 2022].
88. Farrell P, Thow AM, Wate JT, Nonga N, Vatucaawaqa P, Brewer T, et al. COVID-19 and Pacific food system resilience: opportunities to build a robust response. *Food Secur* 2020;12:783–91.
89. Smith K, Lawrence G, MacMahon A, Muller J, Brady M. The resilience of long and short food chains: a case study of flooding in Queensland, Australia. *Agric Hum Val* 2016;33:45–60.
90. Dixon J, Beaton Wells Caron Y, Paul-Taylor J. Consumer-citizens and competition policy in the era of supermarketisation (March 9, 2020). In: *U of Melbourne Legal Studies Research Paper No. 872*; 2020. <https://doi.org/10.2139/ssrn.3550935>.
91. Grimmer L. The diminished stakeholder: examining the relationship between suppliers and supermarkets in the Australian grocery industry. *J Consum Behav* 2018;17:e13–20.
92. Nellist I. *Price controls needed in cost-of-living crisis*. Green Left Weekly; 2023. 3–3.
93. Grimmer L. 2 - disrupting the giants: how independent grocers respond to the supermarket duopoly in Tasmania, Australia. In: Byrom J, Medway D, editors. *Case studies in food retailing and distribution*. Woodhead Publishing; 2019. p. 13–24.
94. Seely A. *Supermarkets: competition inquiries into the groceries market* [Internet]. 2012. <https://researchbriefings.files.parliament.uk/documents/SN03653/SN03653.pdf>. [Accessed 20 October 2022].
95. Commerce Commission New Zealand. *Market study into the retail grocery sector - final report* [Internet]. 2022. https://comcom.govt.nz/_data/assets/pdf_file/0024/278403/Market-Study-into-the-retail-grocery-sector-Final-report-8-March-2022.pdf. [Accessed 14 October 2022].
96. Australian Competition and Consumer Commission. *Supermarkets inquiry* 2024-25. 2025.
97. Select Committee on Supermarket Prices. Competition and Consumer Amendment (Divestiture Powers) Bill 2024. In: *Competition and Consumer Act 2010*; 2024.
98. Food and Agriculture Organization of the United Nations (FAO). *Responding to the impact of the COVID-19 outbreak on food value chains through efficient logistics*. 2020. <https://www.fao.org/3/ca8466en/CA8466EN.pdf>. [Accessed 13 October 2022].
99. Fredericks B, Bradfield A. Indigenous Australians and COVID-19: highlighting ongoing food security issues. *International Journal of Home Economics* 2021; 14:53–65.
100. Hardin-Fanning F, Rayens MK. Food cost disparities in rural communities. *Health Promot Pract* 2015;16:383–91.
101. Ko LK, Enzler C, Perry CK, Rodriguez E, Mariscal N, Linde S, et al. Food availability and food access in rural agricultural communities: use of mixed methods. *BMC Public Health* 2018;18:634.
102. Campbell EA, Shapiro MJ, Welsh C, Blich SN, Cobb LK, Gittelsohn J. Healthy food availability among food sources in rural Maryland counties. *J Hunger Environ Nutr* 2017;12:328–41.
103. Lin X, Ruess PJ, Marston L, Konar M. Food flows between counties in the United States. *Environ Res Lett* 2019;14:084011.
104. Spencer S. *From farm to retail – how food prices are determined in Australia* [Internet]. 2016. <https://www.agrifutures.com.au/wp-content/uploads/publications/16-013.pdf>. [Accessed 21 October 2022].
105. Food and Agriculture Organization of the United Nations (FAO). *The state of food security and nutrition in the world 2020 - transforming food systems for affordable healthy diets* [Internet]. 2020. <https://www.fao.org/3/ca9692en/online/ca9692en.html#>. [Accessed 13 October 2022].
106. Horton P, Bruce R, Reynolds C, Milligan G. Food chain inefficiency (FCI): accounting conversion efficiencies across entire food supply chains to re-define food loss and waste. *Front Sustain Food Syst* 2019;3:79.
107. Australian Indigenous Australians Agency (2024) <https://www.niaa.gov.au/our-work/health-and-wellbeing/national-strategy-food-security-remote-first-nations-communities>. <https://www.niaa.gov.au/our-work/health-and-wellbeing/national-strategy-food-security-remote-first-nations-communities> (accessed September 20 2024).
108. Adams J, Hillier-Brown FC, Moore HJ, Lake AA, Arujo-Soares V, White M, et al. Searching and synthesising 'grey literature' and 'grey information' in public health: critical reflections on three case studies. *Syst Rev* 2016;5:164.

Appendix A Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.anzjph.2026.100313>.