

# Population-based interventions addressing food insecurity in Australia: A systematic scoping review

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## Abstract

**Aim:** Food insecurity (FI) is a critical public health issue in Australia. Population-based interventions aiming to address the socio-ecological determinants of FI are critical for relieving and preventing it. This review aimed to map and summarise the characteristics of population-based interventions addressing household and/or community FI in Australia.

**Methods:** A systematic scoping review was undertaken. Five databases, selected for range and relevance to FI in Australia (“CINAHL plus”, “Ovid MEDLINE”, “Sociological Abstracts”, “Australian Public Affairs Information Service”, and “Rural and Remote Health”) were searched in May 2018 using the terms and relevant synonyms “FI” and “interventions”. In addition a systematic grey literature search using multiple Google searches was undertaken. Data synthesis included categorisation and counting intervention type. Interventions were defined and charted by influence of at least one dimension of food security and impact on the socioeconomic, cultural and environmental conditions.

**Results:** A total of 3565 published and grey literature records were identified, with the final 60 records describing 98 interventions. Few national interventions were identified, with approaches predominantly in Victoria, Northern Territory and Tasmania. Determinants related to living and working environments, food availability and food utilisation were most frequently addressed. Interventions addressing the key determinant of FI economic access were limited. A number of interventions did not appear to be associated with rigorous evaluation.

**Conclusions:** While there is evidence of population responses to FI in Australia, the effectiveness of these remains limited. Importantly there is a lack of coordinated and coherent national responses that address the range of FI determinants.

## KEYWORDS

food supply, food security, nutrition, public health, social determinants of health

## 1 | INTRODUCTION

Food insecurity (FI) is the limited or uncertain availability of individuals', households' and communities physical, social, and economic access to sufficient, safe, nutritious, and culturally relevant food.<sup>1</sup> Increasing evidence suggests that high-income countries such as Australia are facing FI.<sup>2</sup> To date, national monitoring of the prevalence of FI has been limited to a validated, single-item measure within the National Health Survey every 3 years, "In the last 12 months, have you run out of food before you had money to purchase more".<sup>3</sup> While this single-item measure indicates that at least 4% of Australian households do not have sufficient food, it may underestimate the "true burden" of FI and not capture its complexity.<sup>4-9</sup> Importantly, this single-item measure is unable to capture the severity nor temporality of FI experienced by various socio-demographic groups within Australia.<sup>3,5</sup> Studies using more comprehensive, multi-item measures within smaller non-representative Australian populations have typically found the prevalence of FI to be higher, ranging from 10% to above 30%.<sup>4,10-14</sup> FI may contribute to poorer physical, social and psychological health outcomes among children and adults who experience it.<sup>14-16</sup> The specific resources, capacities and conditions which modify resilience to, or risk of, experiencing FI, are referred to as "determinants" of food security and correlate with broader economic and social determinants of health.<sup>17</sup> Present at an individual to global scale, these determinants can be encompassed within four intersecting dimensions fundamental to achieving food security: (1) physical *availability* of food; (2) economic and physical *access* to food; (3) food *utilisation*; and (4) *stability* of the other three dimensions over time.<sup>18,19</sup> Left unaddressed, FI presents as an urgent public health priority, potentially resulting in significant costs to individuals, families and to society as a whole.<sup>14,20</sup>

Recognition of FI, at a household and/or community level, as a critical public health issue has sparked a range of responses from many sectors of government and society.<sup>21</sup> In Australia, consistent with other high income countries, the dominant response to FI has been the provision of emergency food relief<sup>7,22,23</sup> or interventions focused on changing the food knowledge, skills or behaviour of individuals.<sup>24</sup> While these interventions may be able to address some of the immediate consequences of FI at an individual level, they are considered inadequate for shifting the causal or protective determinants of FI which exist on a structural, population level.<sup>20</sup> In contrast, population-based interventions to FI are considered to be critical, effective and necessary to relieve and prevent FI for all Australians.<sup>20,22,25</sup> Population-based interventions are typically referred to as "upstream" interventions that aim to address the socio-ecological determinants of health, which contribute to FI.<sup>26-28</sup> Such

determinants are based in the communities in which people live, work and play, and reflect policy decisions about the distribution of resources, money and power within a population or society.<sup>26-28</sup>

Previously, a non-systematic summary of Australian food security interventions and a review protocol investigating the effectiveness food security community-based interventions in developed countries have been published.<sup>17,29</sup> To the authors' knowledge, a recent and systematic review of past and present population-based Australian interventions related to FI does not exist within the literature. This systematic scoping review aimed to summarise interventions designed to shift the specific socio-ecological determinants and outcomes of FI in Australia to date by exploring the question: "What population-based interventions addressing FI have been undertaken in Australia?" Specifically: (a) In which Australian states and/or territories are these interventions undertaken?; (b) Which determinants and dimensions of food security are being addressed by interventions?; (c) How are the interventions attempting to influence population-based drivers of FI?; (d) Who (governments, non-government organisations and/or other sectors) is leading these interventions?; (e) If and how are these interventions evaluated? The review aims to provide a broad overview of existing, explicitly stated population-based interventions to addressing the underlying determinants of FI in Australia to date.

## 2 | METHODS

Literature on FI interventions is constantly emerging and evolving, heterogeneous in its quality and form, and published through various sources across the academic and grey literature. Thus, a systematic scoping review was conducted instead of a traditional systematic literature review, as it was more appropriate for accommodating varied information sources and answering a question with a broad scope, while still offering a systematic, transparent and replicable process.<sup>30,31</sup> The scoping review protocol was adapted from the Joanna Briggs Institute Reviewer's Manual (2017) and included: defining the research question, identifying relevant studies, selecting studies to include, charting (extracting and synthesising the data), summarising and reporting the results.<sup>32</sup> The review is reported according to the PRISMA guidelines for Scoping Reviews.<sup>33</sup>

Inclusion and exclusion criteria for results obtained from research databases or grey literature searches are summarised in Table 1. Since people living in institutions typically experience limited control in the provision of their own food and meals<sup>34,35</sup> compared to the general non-institutionalised Australian population, only interventions including non-institutionalised human populations living in

**TABLE 1** Eligibility criteria for study inclusion and exclusion

	Inclusion criteria	Exclusion criteria
Relevance to Australia	Published by any organisation or individual based in Australia	Published outside of Australia
Duplication	Describes a unique intervention	Document only refers to intervention(s) described in another document
Language	English	Document only available in language other than English
Completeness of document	Most current version	Document was a draft or summary version, or has been replaced with another document
Population	Describes an intervention targeting a non-institutional Australian population	Response relates to an institutional population <sup>a</sup> or other population residing outside of Australia
Interventions of interest	Describes a current/previous intervention in Australia with at least one socioecological, population-based goal, objective or strategy to change at least one determinant of food security	Does not describe a relevant intervention
Information of interest	Describes relevant intervention in sufficient detail in main body of text to answer research questions	Document provides insufficient detail about relevant interventions <sup>b</sup>

<sup>a</sup>The institutional population includes people living in non-private, institutional settings, defined as dwellings other than private houses, units, apartments, flats, or similar, and may include people living in nursing homes; cared accommodation for the retired or aged; hospitals; prisons, corrective or detention institutions for children or adults; child care institutions and dormitories of schools and hospitals; convents and monasteries. Institutional settings typically provide communal or transitory accommodation and are usually dedicated to the care, treatment or custody of individuals on a residential basis.<sup>21,126</sup>

<sup>b</sup>A number of results were summaries or reviews, which referred to multiple responses to FI. Summaries or reviews which did not produce unique information on FI interventions contained within other results, or did not produce information about interventions included in other interventions were excluded. Due to time limitations, the authors were only able to use and extract information presented in the main text of these summaries and did not further investigate responses that were described without details allowing for adequate extraction (eg, responses only mentioned in reference lists, or where only a name and very short description of a program were provided).

Australia were included. Australian population-based interventions addressing FI were defined as interventions which located and attempted to influence at least one determinant of food security (Table 2) by affecting the socioeconomic, cultural and environmental conditions of a group of people.<sup>18,19</sup> To capture a broad range of results, there was no search date limit applied nor were there restrictions according to the types of studies included in this scoping review. Grey literature sources such as reports, articles and websites were also included.

Five databases were searched in April/May 2018: CIN-AHL plus, Ovid MEDLINE, Sociological Abstracts, Australian Public Affairs Information Service, and Rural and Remote Health, and were selected to cover a range of content and disciplines related to FI in Australia. Search terms were adapted from a previously published review protocol<sup>29</sup> to suit Australian terminology and the different requirements of the chosen database, with additional terms included to capture responses related a wider breadth of food security determinants. See Tables S1 and S2 for search terms.

Screening of abstracts and titles was independently performed by two researchers (VY, SK). Conflicting assessments were resolved via discussion until consensus was achieved. Records deemed eligible progressed to a second screening phase, where full texts were retrieved for further assessment

against the inclusion criteria. One researcher (SK) conducted full text screening on a random subset of 30 records, and another researcher (VY) screened the remainder of full texts. Uncertainties about the eligibility of any record at this stage were discussed between researchers until consensus was achieved. Both EndNote X8.2 (Clarivate Analytics, Philadelphia, Pennsylvania) and Covidence (Veritas Health Innovation, Melbourne, Australia) software were used to manage the selection process.

A separate grey literature search strategy was also employed. Search methods were adapted from a previously published systematic grey literature search plan and applied to capture a manageable volume of results.<sup>39</sup> Five unique search queries were applied in Google searches (Google Chrome, Version 66.0.3359.181, Google Inc., Mountain View, California) in May-June 2018 using a filter to only capture results originating from Australian results (Supplementary Table 2). The first 10 pages of each search's hits (equivalent to 100 results) were reviewed for potential relevancy according to the eligibility criteria (Table 1) using the page title, accompanying text snippet and the first screen (webpage or document) of each result. Links assessed as being potentially relevant were "bookmarked" in the Google Chrome web browser in a sub-folder named according the search query used, enabling subsequent extraction into Microsoft Excel

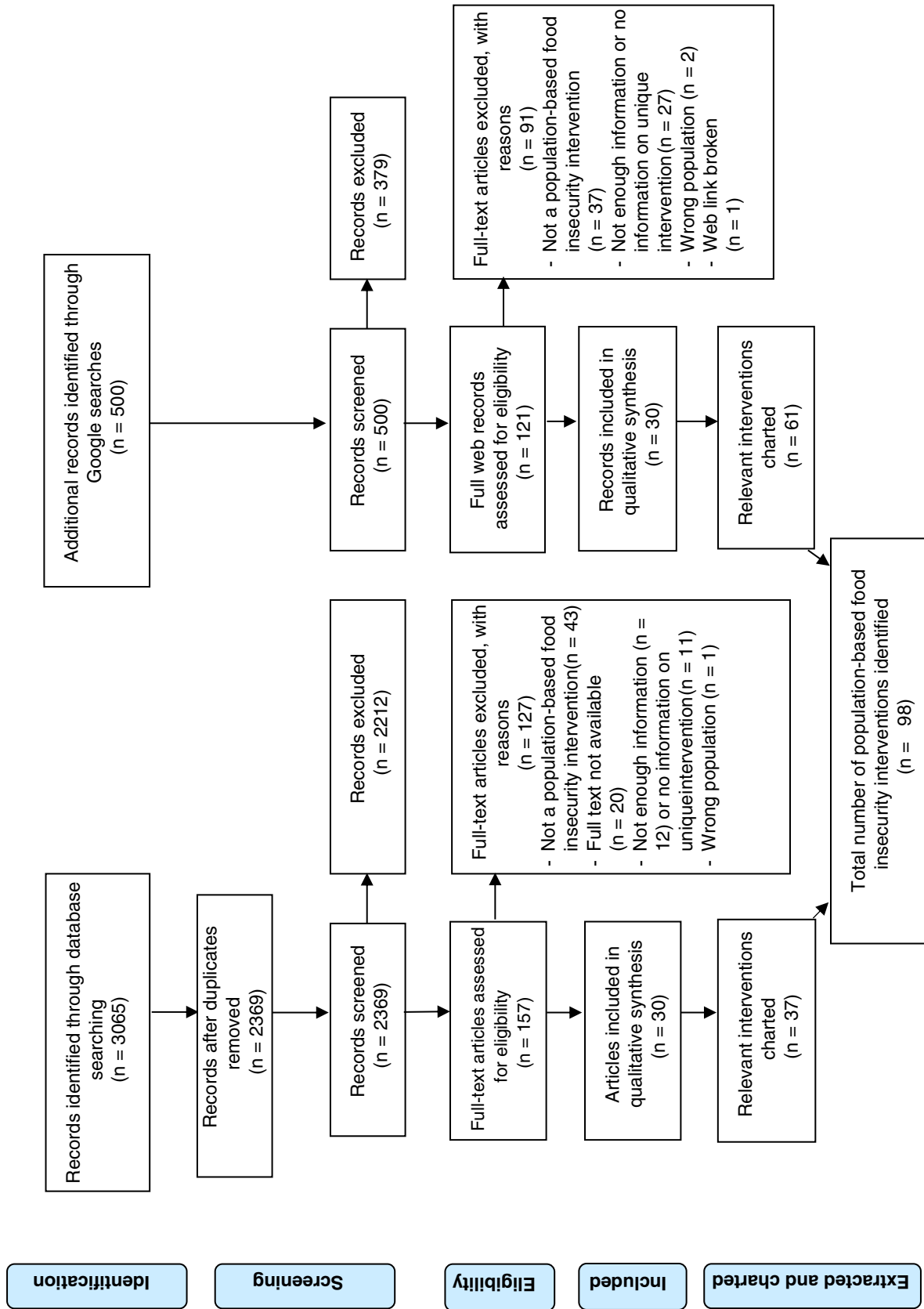
**TABLE 2** Descriptions of food security dimensions and determinants<sup>17,36-38</sup>

Food security Dimension/determinant	Description
<b>1. Food availability</b>	The physical presence of sufficient choice and quantity of nutritious foods which are affordable, competitively priced and of appropriate quality to meet dietary needs and preferences.
<i>Food outlet location</i>	Refers to the geographic location of food outlets, including food retail stores (eg, supermarkets, greengrocers) and outlets selling prepared food.
<i>Quality and variety</i>	Indicators of food quality include the freshness, nutritional value, flavour and acceptability of food. Food variety is optimal when there is a wide range of nutritious, fresh and processed foods available.
<i>Availability in food outlets</i>	Refers to the regular availability of nutritious and acceptable foods within local food outlets.
<i>Promotion</i>	Refers to the various ways different foods may be promoted, affecting consumers' food choices and ability to identify and locate food. Promotion methods may include food advertising, pricing discounts or “specials”, and the positioning of foods in food outlets or of food outlets themselves.
<i>Price</i>	The affordability and retail price of different foods may significantly impact food purchasing behaviour and consumption, especially for people with low incomes and/or limited disposable income for food.
<b>2. Food access</b>	The ability to acquire food which is safe, affordable, culturally acceptable and nutritious through the use of physical and/or financial resources.
<i>Financial resources</i>	Refers to having enough money to buy nutritious, acceptable and good quality food.
<i>Transport to shops</i>	Refers to the accessibility, availability and adequacy of private or public transport to reach food outlets
<i>Social support</i>	Refers to the ability to use social support networks such as family and friends to assist with food, money and/or transport during periods of FI
<i>Mobility</i>	Good physical mobility is usually required to independently shop for food and prepare meals. Limited physical mobility may restrict these abilities and is often experienced by older people, people with disabilities or those experiencing injuries.
<b>3. Food utilisation</b>	The ability to transform acquired food into safe, nutritionally adequate and culturally acceptable meals to support a nutritious diet where all physiological needs are met.
<i>Knowledge</i>	Refers to an understanding of basic food and nutrition knowledge, including topics such as how to make healthy food choices and ingredient substitutions, label reading and food safety.
<i>Skills</i>	Refers to the set of skills required to obtain and prepare safe, nutritious and culturally acceptable meals, including planning, food preparation, cooking, and budgeting skills.
<i>Preferences</i>	Refers to the desirability, amenability and/or palatability of foods which affects food choice and consumption. Food preferences may be influenced by factors such as nutrition knowledge, eating habits, sociocultural factors, allergies and intolerances, marketing, and time available to prepare food.
<i>Storage and cooking facilities</i>	Refers to the equipment and resources required to adequately and safely store, prepare and cook food to support healthy eating. Storage facilities should be secure and provide adequate storage room, and may include a fridge, freezer and/or pantry. Cooking facilities including knives, chopping boards, stoves, etc.
<i>Time</i>	Shopping for and preparing healthy meals requires adequate time availability. A lack of time may limit access to a healthy diet and increase reliance on processed or take-away foods of poorer nutritional quality than home-prepared meals.
<b>4. Stability</b>	Refers to a sustained ability to access and acquire sufficient quantities of safe, nutritious, affordable food of appropriate quality to meet dietary needs and preferences, at all times.

(Microsoft, Washington) for further screening. Potentially relevant grey literature records were retrieved as offline downloaded documents, or viewed at the original URL. Records were screened by one researcher (VY) according to the inclusion criteria (Table 1) with decisions recorded in an Excel

spreadsheet. Where the eligibility of any grey literature record was unclear, this was discussed with a second researcher (SK) until agreement was achieved.

Data extraction included name, intervention location and funder, target population and date of implementation. To



**FIGURE 1** Flow diagram describing record inclusion for population-based interventions addressing food insecurity in Australia systematic scoping review

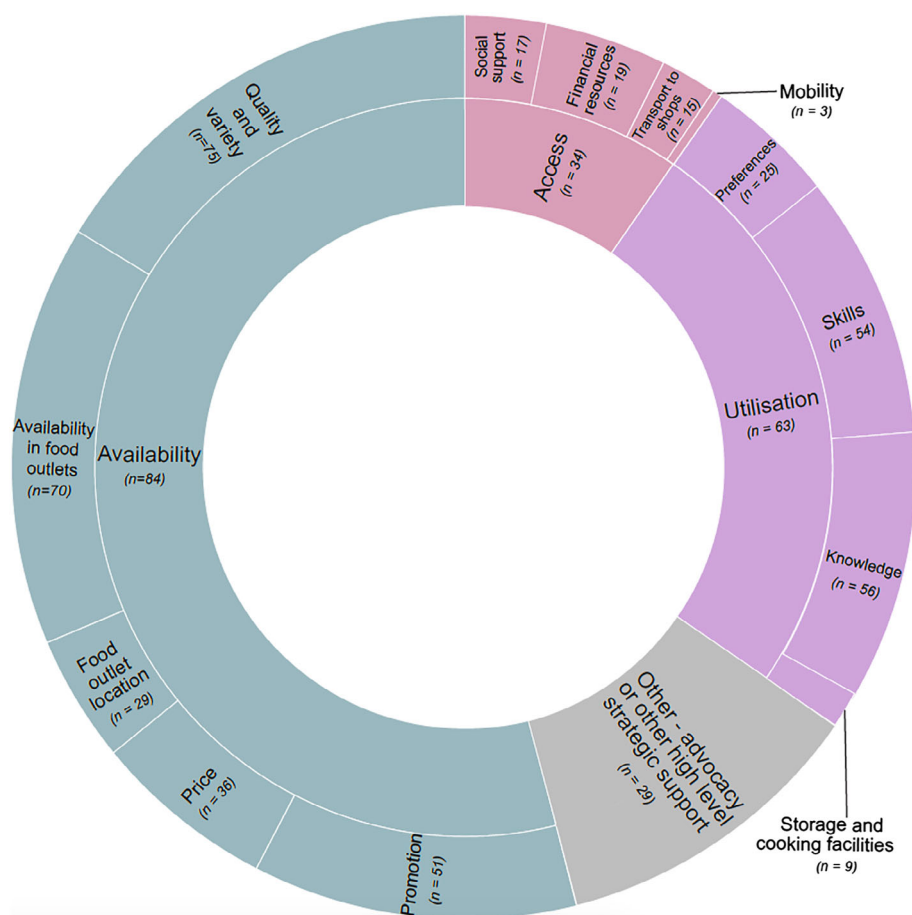
describe how included responses related to the “causes of the causes”<sup>27</sup> of FI and the social determinants of health, three broad and hierarchical categories were used within the data extraction form to provide an indication of where responses were locating and attempting to influence population-based drivers of FI. These categories were adapted from similar analyses of public health responses<sup>40</sup> and based on health equity and social determinants of health literature.<sup>26,28,40-44</sup> They included (1) local, community-based interventions responding more directly to causes of FI, to (2) interventions within living and working environments and settings, to (3) pro-active, sociocultural interventions attempting to shift overarching societal conditions, norms and structures most indirectly causing FI. Ten per cent of the records ( $n = 10$ , randomly selected) were independently extracted by another researcher (SK) with minor discrepancies in the volume and level of detailed information identified and resolved via discussion until consensus was achieved, and the final data extraction entries revised for all records based on these discussions. Extracted data were summarised through a data “charting” process for this scoping review, whereby a visual, graphical overview of the extracted data is presented.<sup>30,31</sup> Graphical overviews of the dimensions and determinants of food security, and how

responses aimed to influence food security determinants, were produced from this charting process in lieu of a tabular summary of included studies.<sup>30,31</sup> Typical of scoping reviews a formal quality assessment of included records was not undertaken for this review.<sup>45</sup>

### 3 | RESULTS

The database and grey literature search returned a combined total of 3565 records. After excluding duplicate records, those which did not meet inclusion criteria, and those for which full text articles or web links could not be retrieved; 60 records (30 identified via database search and 30 identified through Google searches) were included, describing 98 unique population-based responses to FI in Australia (Figure 1, Table S3). Table S3 summarises each intervention and relevant associated literature.<sup>11,17,46-112</sup>

Eight population-based interventions to FI were identified as targeting the whole Australian population, with a further two interventions focused on remote Indigenous communities across multiple states. Comparing the non-national interventions across states or territories, Victoria had the highest number ( $n = 26$ ), followed by the Northern Territory ( $n = 14$ ), New South Wales ( $n = 13$ ), Tasmania



**FIGURE 2** Determinants and dimensions of food security addressed by included interventions<sup>(a)</sup>

( $n = 11$ ) and South Australia ( $n = 10$ ). There were fewer included interventions in Western Australia ( $n = 7$ ), Queensland ( $n = 3$ ), the Australian Capital Territory ( $n = 3$ ). One intervention targeted a population located within two council areas which share the Victorian-New South Wales border. The majority of interventions ( $n = 67$ ) included strategies targeting whole populations defined by their area or institution (eg, people living within a particular local government area, state or territory; school communities or health service management). Twenty-five interventions specifically targeted populations experiencing higher prevalence, or risk, of FI. Some interventions ( $n = 6$ ) took a whole-of-population approach but also had additional strategies to reach population groups with greater identified risk or prevalence of FI.

The availability of information regarding funding sources and time periods for which interventions were active varied. Most records either did not state any information about the period for which an intervention was active ( $n = 30$ ), or stated the commencement date of the response ( $n = 44$ ). The funding sources of responses were not reported as intended due to limited reporting in documents reviewed.

The majority of included interventions addressing FI featured strategies or objectives to address the food availability “dimension” of food security ( $n = 84$ ) and food utilisation ( $n = 63$ ), while fewer interventions had strategies focused on food access ( $n = 34$ ) (Figure 2). Almost a third of interventions also featured a range of other high-level strategies to address one or more food security dimensions ( $n = 29$ ) through activities such as advocacy, capacity-building, collaboration between relevant stakeholders, and/or investment in programs, projects or services related to FI. Within these identified FI interventions, some determinants were more frequently represented than others, with the exception of time (in consideration of food utilisation), which did not feature in any intervention (Figure 2).

Most interventions ( $n = 67$ ) aimed to influence the underlying socio-environmental, cultural and/or economic processes, political and cultural systems and norms which contribute to FI through strategies such as advocacy, strategic partnerships, policy, governance and legislation whilst targeting determinants related to living and working conditions. Fewer interventions ( $n = 10$ ) focused on community strengthening, resilience, and building social support and cohesion.

The organisations, institutions or other groups involved in leading the identified interventions were categorised according to sector types including: government (local, state or federal), non-government or non-profit (including charitable organisations), private businesses, and universities. Though most interventions were led by actors from a single sector ( $n = 69$ ), many involved actors from multiple sectors ( $n = 29$ ). Of the included interventions, the majority

involved state or territory government entities ( $n = 60$ ) and with considerable involvement from non-profit, non-government and charitable organisations ( $n = 27$ ). Fewer interventions were led by governments at a local and federal level ( $n = 21$  and  $n = 17$ , respectively). A minority of interventions were described as being led by private sector ( $n = 13$ ) or university groups ( $n = 7$ ).

Approximately 40% of the population-based interventions which addressed FI included in this review provided no description of any proposed or completed evaluation efforts ( $n = 40$ ). Other interventions detailed one or more evaluations. Thirteen interventions proposed future evaluation plans in limited detail, while 10 included statements that an evaluation or formal review had been completed, though limited further details were provided. Fourteen interventions described conducting process evaluations, nine interventions used informal progress reports, and 16 involved impact evaluations. Very few interventions described conducting formative ( $n = 3$ ) or economic ( $n = 1$ ) evaluations. Four interventions were subject to federal government inquiries and audits by the Australian National Audit Office, and one intervention was a randomised controlled trial, which measured pre-during-post-intervention outcomes.

## 4 | DISCUSSION

This scoping review aimed to explore population-based FI interventions undertaken in Australia. There were relatively few national interventions indicating a limited coordinated and coherent national response to FI. Determinants related to living and working environments, food availability and food utilisation were most frequently addressed in the interventions. Additionally a significant proportion of interventions did not appear to be associated with any rigorous evaluation efforts. Of importance these findings highlighted the limited interventions that are focussed and/or consider the key determinant of FI; financial access, for example policy responses to address adequate income.

Previous national nutrition activities such as the Food and Nutrition Policy (1992) and Eat Well Australia (2000-2010) have considered addressing food and nutrition insecurity; however, these policies and programs have historically been regarded as being inadequately resourced.<sup>113,114</sup> Accordingly, the relative abundance of responses at a state government level may in part be compensating for this lack of a national, whole-of-government approach to addressing FI. Notably, five of the eight national interventions to FI identified in this scoping review focused on Aboriginal and Torres Strait Islander populations. Unlike for the non-Indigenous Australian population, there has been a succession of high-level national strategies, plans and inquiries related to addressing FI among Aboriginal and Torres Strait Islander, particularly following

the establishment of the National Aboriginal and Torres Strait Islander Peoples in Australia Nutrition Strategy and Action Plan (NATSINSAP) in 2000.<sup>56,59,115-120</sup>

Compared to other Australian states and territories, there was a disproportionate number of interventions based in Victoria. Ten of the twenty-six Victorian interventions identified in this review involved local government actors. The significant response from this sector in Victoria is consistent with previous national surveys of Australian local government activities conducted by Yeatman<sup>121</sup> in 1995 and 2007. These highlighted local governments to be significantly more active in engaging with food and nutrition issues in Victoria than elsewhere. Since 1995, some Victorian local governments have received financial and resource support to address food and nutrition issues by VicHealth's "Food for All" food security program (2005-2010)<sup>87</sup> and "Food Alliance" food systems partnership (2009).<sup>122</sup> However, there are likely other factors contributing to greater engagement in Victoria as the 1995 survey results indicated disproportionate activity even before these additional supports existed.<sup>121</sup> VicHealth's strategic and funding priorities have since appeared to shift away from supporting local governments to improve community food security, to focusing more on improvements to consumer food and beverage choices and product reformulation.<sup>123</sup>

Interventions identified in this scoping review most frequently aimed to improve determinants of household and/or community food security within the food availability dimension (Table 1 and Figure 2). Some of the determinants associated with food availability, such as food quality and variety, availability in food outlets, promotion, and price, were addressed most often, consistent with the finding that most included interventions attempted to influence living and working conditions where these determinants may manifest and affect food systems. Policies and programs related to improving the supply of healthy food within schools, health services, and/or retail environments have been implemented across Australia (Table S3). However, with few associated impact or outcome evaluations for settings-based responses identified in this review, evidence regarding the actual effect of these healthy food supply responses on community food and nutrition security is unknown. The reason for limited evaluation evidence may be multifactorial and broadly categorised according to three factors: organisational (eg, understanding of the role of evaluation), capacity (eg, evaluation knowledge and skills, financial resources) and translational (eg, difficulties translating evaluation findings to practice).<sup>124</sup> A potential implication of limited evaluation is that responses that have no or negligible impact on addressing or improving food and nutrition security status may continue to be funded and/or implemented. Evaluation of interventions need to be

adequately planned, with outcome measures and tools, and resourced; financial and with adequate skill development.

The majority of responses also addressed the determinant of food utilisation, especially food skills and knowledge, which may be somewhat expected given the traditional focus of public health nutrition interventions in these areas.<sup>24</sup> This is despite using eligibility criteria which only included interventions that addressed food-related skills, knowledge and behaviour if they also featured strategies involving broader social or environmental changes. In combination with other social and environmental changes conducive to healthy food consumption, strengthening food skills and knowledge can contribute to resilience and to improving nutrition issues such as low vegetable consumption.<sup>7,125</sup> However, while these interventions are widely perceived to be valuable in addressing FI in Australia and internationally, the ability of food literacy to improve FI in deprived or disadvantaged contexts is limited where food quality or quantity is inadequate.<sup>7,21,126</sup> Previous population surveys conducted in other high-income countries have found no deficit in food skills among food-insecure households compared to food-secure households.<sup>126</sup> Food literacy skills can only protect or buffer the experience of FI to a point. Stronger associations between being on Australian social assistance payments and experiencing FI have been demonstrated within the literature, particularly for people on payments such as the Newstart Allowance (deemed among the most inadequate payments to support healthy living).<sup>127</sup> Accordingly, the perception of food skills programs as an appropriate population-based solution to addressing FI due to inadequate household incomes has been questioned.<sup>21,126</sup>

No interventions considered the potential impact of time poverty on the procurement and preparation of food on food security status in domiciled households. Literature indicates that insufficient time is among the most frequently cited barriers for healthy eating<sup>128</sup> and that a lack of time for household food provisioning in addition with other factors may impact on food security for some households.<sup>129,130</sup> This finding supports sentiments that the way in which time "contours" health and issues such as FI may indeed be neglected in health and social policy and interventions.<sup>128</sup>

The necessity of policies and programs to address the structural drivers of FI in Australia has long been recognised for the potential scale of their preventative impacts.<sup>24,131</sup> However, population-based interventions to FI identified in this scoping review appeared to lack rigorous evaluations and detailed reporting on process and program implementation issues. This could indicate that despite the recognised importance of such interventions, there have been missed opportunities to strengthen the evidence base regarding the factors which may contribute to a more effective population-based FI intervention. This may impede the capacity of FI



workforce to effectively advocate for and justify their inclusion in evidence-informed policy and practice. Given the documented significant health, social, and environmental impacts of FI there is the need for advocacy for leadership by Government to provide strategic direction inclusive of funded policy solutions to address the complex array of determinants. This needs to be supported with evaluations that are adequately resourced such that the findings may be translated to “practice”.

This systematic scoping review presented an overview of population-based interventions to address FI undertaken in Australia to date. To the authors knowledge this is the first of such a review in Australia and is crucial to inform the FI workforce, academics, and policy makers. Using a systematic search process to locate and summarise the interventions of interest it highlights the focus of such interventions and their jurisdictions for example; across government tiers and sectors, non-government organisations and not for profits. Importantly it provides evidence of an absence of a coordinated, coherent national response to FI. This could be rectified by the development of a resourced policy for example, a National Food and Nutrition policy that is inclusive of food security and intercepts with other broader policy based responses that address other key drivers.

This review included both peer reviewed and grey literature, however it was dependent on the availability of information. The grey literature search was appropriate in the custom Google search to scope a wide pool of results, yet such searches are powered by complex relevancy rankings, algorithms and potentially influenced by personalisation which may limit the repeatability of results.<sup>28</sup> Further, a synthesis of evaluation findings was not completed as part of this review and the majority of included literature would be regarded as low-level evidence in a traditional evidence hierarchy, though this was appropriate for the research question and reflects the nature of evidence in this area of research.

The review highlighted responses most frequently addressed food availability and utilisation, and often attempted to affect change within living and working environments. While this review identified numerous interventions including strategies aiming to influence the various sociopolitical, environmental and cultural structures and processes which contribute to FI, there was a notable absence of interventions with a lack of evaluation. In order to contribute to the evidence base of the impact and effectiveness of FI interventions it is imperative that they are evaluated in a rigorous manner and document their public health implications.

In order to address this public health issue there needs to be a shift from predominantly individual responsibility food based responses towards “upstream” population interventions that addresses the key FI determinants with a committed and

shared action by Government and decision makers and is inclusive of the voices of those experiencing this issue.

## AUTHOR CONTRIBUTIONS

V.Y. conducted the literature search, record screening, and data synthesis as part of the requirements for an Honours degree. V.Y. wrote the manuscript reviewed and revised by S.K. and C.P. S.K. and C.P. formulated the original research question, and oversaw the study design and completion of the study. S.K. assisted with screening records. All authors are in agreement with the manuscript and declare that the content has not been published elsewhere.

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## SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

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