




Urban food planning and management in Melbourne: current challenges and practical insights

Leticia Canal Vieira, Silvia Serrao-Neumann & Michael Howes

To cite this article: Leticia Canal Vieira, Silvia Serrao-Neumann & Michael Howes (25 May 2024): Urban food planning and management in Melbourne: current challenges and practical insights, *International Planning Studies*, DOI: [10.1080/13563475.2024.2358005](https://doi.org/10.1080/13563475.2024.2358005)

To link to this article: <https://doi.org/10.1080/13563475.2024.2358005>

 [View supplementary material](#) 

 [Published online: 25 May 2024.](#)



 [Submit your article to this journal](#) 

 [View related articles](#) 

 [View Crossmark data](#) 



Urban food planning and management in Melbourne: current challenges and practical insights

Leticia Canal Vieira ^{a,b}, Silvia Serrao-Neumann ^{a,c} and Michael Howes^d

^aCities Research Institute, Nathan campus, Griffith University, Brisbane, Australia; ^bDepartment of Management, University of Bologna, Bologna, Italy; ^cSchool of Social Sciences, The University of Waikato, Hamilton, New Zealand; ^dCities Research Institute, School of Environment and Science, Griffith University, Brisbane, Australia

ABSTRACT

Over the last decades, local governments have begun to develop urban food planning instruments focused on improving public health and environmental sustainability, but shortcomings still exist. This paper builds on the case of the Melbourne Metropolitan Region (Australia) to elaborate on how urban food planning and management can address the challenges exposed by a systemic approach. Challenges include strengthening local food economies, developing a nexus between the urban environment, public health, and sustainability, and the circular management of food production resources. Our study contributes to urban food planning and management practice by identifying how policy instruments have successfully addressed these key challenges, and existing inconsistencies between policies and planning. Furthermore, policies should go beyond incentives for urban gardens and explore new areas of intervention, including integrating local producers and retailers into urban food planning, prioritizing fresh food commercialization over ultra-processed products, and integrating composting into waste management.

ARTICLE HISTORY

Received 24 May 2022
Accepted 16 May 2024

KEYWORDS


Urban food system;
sustainability; local food
initiatives

1. Introduction

Ericksen (2008) provided one of the most comprehensive approaches to food systems by demonstrating how food security was dependent not only on the well-functioning of the supply chain activities (e.g. production, processing, distribution) but also on the socio-economic, political, and environmental drivers that compose the food system. This is because food systems are complex socio-ecological systems that involve a wide range of interactions between human and natural components (Allen and Prospero 2016). A food system view highlights relevant issues for ensuring food security and strongly influences the sustainability and resilience of the whole food life cycle (Béné et al. 2019; Debru and Brand 2019; Jacobi et al. 2019; Maxwell and Slater 2003). These include the environmental impacts resulting from food production, the persistent problems of malnutrition and rising obesity, and the negative economic impacts created by the industrialization and globalization of food.

Such systemic views of food security have found limited uptake by national food planning and management, which primarily focuses on increasing production levels as their main strategy (Pereira and Ruysenaar 2012). At the local level, however, many cities have started to use an urban food

CONTACT Leticia Canal Vieira  leticia.canalvieira@unibo.it  Cities Research Institute, Nathan campus, Griffith University, 170 Kessels Road, Brisbane, QLD 4111, Australia; Department of Management, University of Bologna, Via Terracini 28–40131 Bologna, Italy

 Supplemental data for this article can be accessed online at <https://doi.org/10.1080/13563475.2024.2358005>.

© 2024 Informa UK Limited, trading as Taylor & Francis Group

system (UFS) approach to plan and manage urban food (Cretella 2016). The UFS approach encompasses all the activities, actors and impacts related to the food supply of urban areas (Dubbeling et al. 2016). It also addresses social and environmental issues related to urban spatial configurations and lifestyles (Sonnino 2016). From a social perspective, the approach enables acknowledging a range of factors (from urban form to governance structures) to create strategies that address current social inefficiencies and inequalities (Steele and Legacy 2017). From an environmental perspective, it promotes circular practices to avoid the impairment of nutrient cycles and environmental degradation (Warshawsky 2015). In addition, the UFS approach provides a platform for urban food planning and management to improve public health and social equality, integrate urban and rural environments, support community development, enhance environmental protection, and build resilience to climate-related events (Matacena 2016).

Some (e.g. Smit 2016) argue that the UFS transformative potential lies within local government responsibilities. These include responsibilities related to infrastructure, land use planning, waste management, retail regulations and public health initiatives that can influence environmental, social and economic outcomes. The use of an UFS approach can also assist with the incorporation of sustainability and resilience into urban food planning and management (Vieira et al. 2018). Hence, the UFS approach creates opportunities for action that can improve urban well-being and liveability (Bedore 2010; Kasper et al. 2017), especially considering a growing urban population. Urban food planning highlights the importance for land use planning to better understanding urban-rural relationships, and the role it can play in fostering the regeneration of rural and peri-urban areas to ensure a sustainable future for cities and regions alike (Borrelli 2018).

UFS are not intended to establish a geographical border or be a tool for planning self-sufficient cities (Cretella 2016). In fact, healthy diets and food resilience depend on activities outside of urban areas and focusing on local food production does not necessarily translates in better outcomes (Anderson 2015; Borrelli 2018). In taking a UFS approach, the planning and management of food in urban areas can generate multiple benefits, including support for increased food security and reducing food loss and waste with its associated environmental impacts. However, urban food strategies and policies often fall short of creating synergies among all the different realms involved in food production and management predicated by the UFS approach (Sibbing, Candel, and Termeer 2021).

This paper focuses on the Melbourne Metropolitan Region (Australia) to investigate how urban food planning and management can address the current challenges faced by UFS. The paper first outlines the main challenges confronting food planning and management at the urban scale. It then interrogates how the current UFS approach responds to those challenges by analysing planning instruments from local governments in the Melbourne Metropolitan Region. Our study contributes to urban food planning and management practice by both identifying policy instruments that have successfully addressed these key challenges, and existing inconsistencies between planning schemes and food policies. Furthermore, we suggest that city policies should go beyond incentives for urban gardens and explore the potential of new areas of intervention, including the integration of local producers and retailers into urban food planning, the prioritization of healthy fresh food over ultra-processed products, and the integration of composting into waste management.

2. Conceptual framework: current challenges to urban food planning and management at the local urban scale

Scholars (Candel 2020; Sibbing, Candel, and Termeer 2021; Sonnino, Tegoni, and De Cunto 2018) suggest that urban food planning and management are confronted with three main interconnected challenges when applying a UFS approach. These include: (i) how to strengthen local food economies; (ii) how to develop a stronger nexus between the urban environment, public health and sustainability; and, (iii) how to enable the circular management of food resources (i.e. land, water and nutrients).

First, current urban food supply systems rely mainly on globalized supermarket chains that draw from worldwide food sources and are based on mass production (Forster et al. 2015). Food provisioning through direct urban-rural linkages has become less common, and small food businesses struggle to compete with large supermarket chains. Current food networks are centralized around a set of players that influence food production, distribution and, ultimately, consumption (Jennings et al. 2015; Roggema and Spangenberg 2015). This industrialized food system creates alienation and makes it easier for unsustainable social, environmental and economic practices to arise (Kirschenmann 2008; Roggema and Spangenberg 2015). Hinrichs (2016) describes this lack of connectivity as the phenomenon called ‘food from nowhere’. ‘Food from nowhere’ is a configuration where interaction or even acknowledgement between members of the food system is not encouraged, resulting in consumers being disconnected from the source of their food and not knowing the impacts their food choices might be causing (Hinrichs 2016). Additionally, the reduction of local players can also reduce the resilience of UFS. Current centralization limits the number of food distribution routes and reduces the diversity of available response channels to supply shocks (Berno 2017; Moench 2014; Smith and Lawrence 2018). Food production in peri-urban areas decreases due to urban sprawl, which forces food production to occur in more distant, remote areas (Zasada 2011). This impairs essential urban-rural connections for fresh food access and the economic viability of small farmers (Cerrada-Serra et al. 2018; Kuusaana and Eledi 2015). Urban agriculture is frequently part of urban food strategies, but clear targets and action planning to allow food production in urban areas are often missing (Candel 2020).

Second, food security has been approached by urban food planning instruments because the urbanization processes can directly impact food security (Candel 2020; Sonnino, Tegoni, and De Cunto 2018). The food security concept not only emphasizes that food availability is critical, but also food access, adequate utilization, and supply stability (FAO 2006). Urban areas have a much more diverse food supply than rural ones along with more robust supply chains and storage possibilities. Yet, this does not mean urban areas are immune to food insecurity. If food availability is often not a problem in urban areas, the equitable access to proper diets by urban residents is. Accessibility to food depends both on physical and economic accessibility (Ruel et al. 2017). For example, poorer urban residents can become malnourished due to unequal food access (Hendriks 2015). This can be further compounded by urban food deserts – that is, geographical areas lacking fresh food outlets or economically accessible fresh foods (Russell and Heidkamp 2011). For example, physical distance and inadequate public transport can prevent socioeconomic deprived urban residents from accessing fresh food (Kato and McKinney 2015). Even when food outlets are available, low-income populations may choose cheaper food products that often have lower nutritional value (Kato and McKinney 2015). Additionally, the marketing of processed food that is high in energy but low in nutrients is prevalent in urban areas. Urban lifestyles can lead to a reliance on ready-to-eat foods and meals that are often less nutritious than traditional diets (Ruel et al. 2017). The easy availability of ultra-processed products and their compatibility with the routines of many can contribute to malnutrition or overnutrition in urban areas, even when food access is available (Ruel et al. 2017).

Current rates of eating disorders and obesity demonstrate that factors beyond food access can compromise food security (Koç 2010). Current dietary patterns are one of the leading causes of the increase in the overweight population, leading to a rise in diabetes and cardiovascular diseases (Gordon et al. 2017). Hence, the characteristics of urban food environment are also essential factors in influencing dietary patterns. For example, poor urban planning can create limited opportunities for people to access affordable fresh food, which can feed both sides of the food security spectrum, from malnutrition to overnutrition (Bedore 2010). Consequently, urban food planning and management has a key role in supporting residents’ choice and access to healthier diets (based more on plant-based food and less on meat, added sugar, salt and processed foods) (Berry et al. 2015; Willett et al. 2019). Such diets would not only create better health outcomes but also reduce their environmental impacts (Willett et al. 2019).

Finally, large amounts of food produced elsewhere are brought to cities every day, generating significant food waste, far from being treated as part of a closed-loop economy or ecosystem (Garnett 2011). Most urban waste management practices do not encourage recycling nutrients to be reused in further food production (Shafiee-Jood and Cai 2016). While food production is often not the core business of urban policies, they can have an essential role in ensuring better urban waste management so that nutrients are recycled. Food production depends on the cycles of nutrients like carbon, nitrogen, and phosphorus, and those resources are often extracted and produced in locations far from UFS. For example, phosphorus used in the making of fertilizers is currently mined and depleted as a resource in areas or continents with significant environmental and social implications out of sight of many urban residents (Cordell et al. 2011; 2009). Additionally, food stability depends on healthy environments where nutrient cycles are well functioning, water is available and clean, and supported by conducive climatic conditions favourable to food production. Nonetheless, the food security agenda has placed less focus on the environmental conditions that ensure the stability of food supply. Recent studies on food systems resilience seek to explore this dimension (Hendriks 2015), but the role that urban food planning and management can play in ensuring food systems' circularity is still unclear.

3. Methods

Our study aims to investigate how urban food planning and management can address the current challenges faced by UFS by focusing on the Melbourne Metropolitan region. The region comprises a suitable case for analysis as Melbourne has been voted the most liveable city in the world ten times since 2002 (State Government of Victoria 2022). We conducted a qualitative content analysis of regional and local planning plans and strategies and food-related instruments from local government areas (LGAs) that compose the Melbourne Metropolitan region. The region comprises around 4,9 million people and is the second-largest metropolitan region in Australia. Melbourne is divided into thirty-one LGAs responsible for planning, infrastructure, public health, community services, solid waste management, recreation and culture, and emergency management. Although food is not a direct responsibility of LGAs, their competencies include issues that considerably impact food systems. Out of the 31 LGAs, Melbourne City is the most prominent in urban food planning and management. The city is a signatory of the Milan Food Policy Pact and has a food policy in synergy with the international context (Candel 2020; Sonnino, Tegoni, and De Cunto 2018). Apart from Melbourne City, other nine LGAs within the region have specific urban food planning instruments (see Figure 1).

The Melbourne Metropolitan Region is an urban area that previously had a significant amount of fresh food grown in its peri-urban areas. However, increased urbanization has progressively replaced productive lands (Amato-Lourenço et al. 2021). Figure 2 illustrates the current land use, which shows that several LGAs within the Melbourne Metropolitan region still maintain food-related activities, particularly grazing of sheep and beef and horticulture. The metropolitan region is responsible for 47% of the vegetables grown in the State of Victoria (Carey et al. 2016). Of the LGAs analysed, only four have completely classified land use as solely urban: Moreland, Melbourne, Yarra, and Darebin. The remaining LGAs still have some economic activity linked to agricultural production (Agriculture Victoria 2024). Despite the growing pressure of urbanization on Melbourne's food bowl, the region still maintains an agricultural vocation, which helps to reduce the threat of food scarcity.

3.1. Data collection and analysis

The documents collected for the content analysis are listed in Table 1 along with their scope and the rationale for including them in the analysis. They include regional and local plans and strategies related to urban food planning and management and land use planning of the selected nine LGAs.

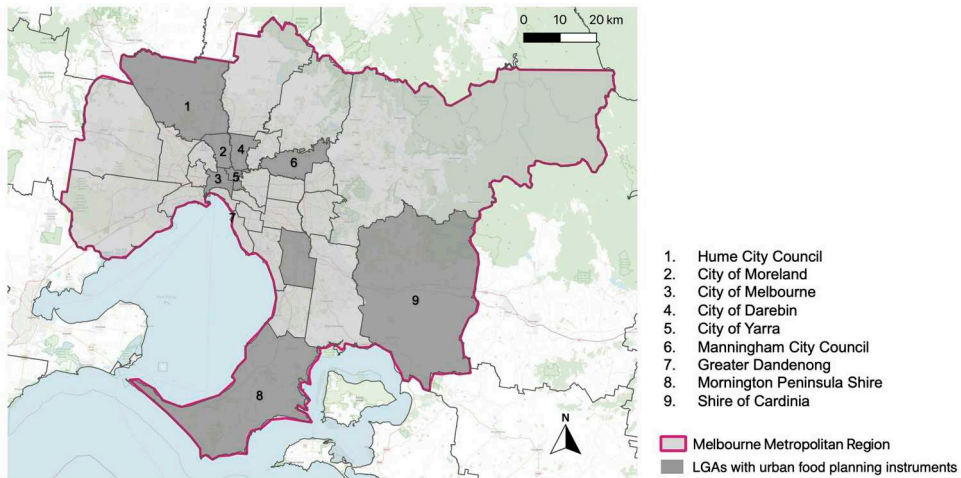


Figure 1. Local government areas that have urban food instruments and were included in the analysis.

The three challenges to urban food planning and management described in Section 2 comprise the core of the thematic areas used to guide the content analysis, namely: (i) the strengthening of local food economies; (ii) the nexus between the urban environment, public health, and sustainability; and, (iii) the circular management of food resources (land, water and nutrients) (see Table 2). The NVivo 11 software text-search function was used to assist in analysing longer documents (e.g. planning schemes and the Plan Melbourne Strategy). The keywords presented in Table 2 were used to identify relevant passages that were then coded in their respective nodes. The urban food planning instruments were read in total, and the analysis followed the steps of skimming, reading, and interpreting relevant sections (Bowen 2009). When documents explicitly mention one of the thematic areas, their proposed goals, strategies, or actions were further scrutinized. Relevant passages were then coded in the three main thematic areas of analysis (see Supplementary Material for further detail).

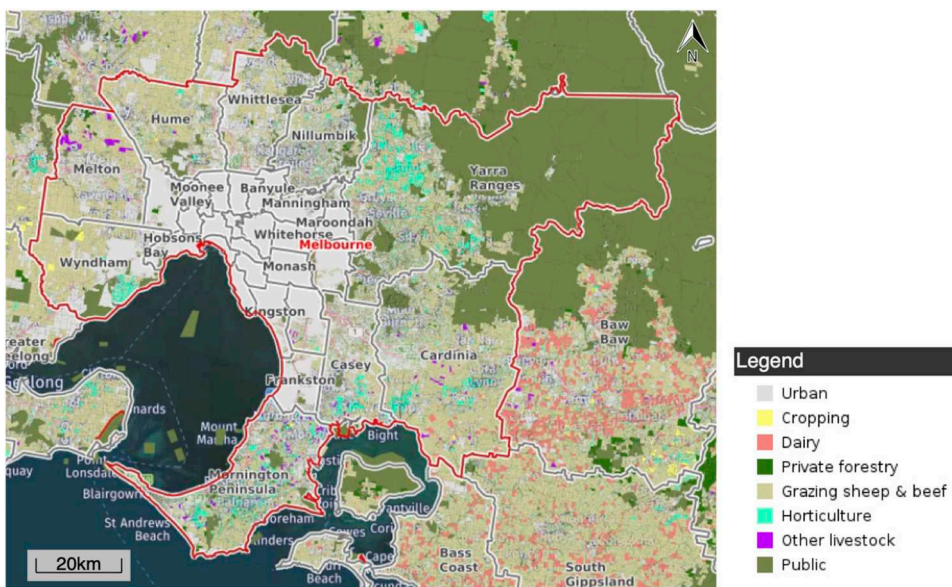


Figure 2. Land use types across the Melbourne Metropolitan Region and adjacent boundaries (Source: Agriculture Victoria 2024).

Table 1. Description of documents analysed.

Scale	Regulatory status	Documents	Scope	Rationale for inclusion in the analysis
Regional	Statutory	Plan Melbourne Strategy (2017–2050)	The vision that guides the city growth for the next 35 years. It is a cooperation effort between state agencies and LGAs.	The strategy serves as a guide to policy documents that will be developed by LGAs within the region. It is also the instrument that attempts to integrate the different LGAs within the region.
Local	Statutory (land use planning)	<ol style="list-style-type: none"> 1. Melbourne Planning Scheme (2020) 2. Mornington Peninsula Planning Scheme (2020) 3. City of Darebin Planning Scheme (2020) 4. Greater Dandenong Planning Scheme (2020) 5. Hume City Council Planning Scheme (2020) 6. Manningham Planning Scheme (2020) 7. Moreland Planning Scheme (2020) 8. Cardinia Planning Scheme (2020) 9. Yarra Planning Scheme (2020) 	Planning schemes establish zones and overlays and other provisions that guide land use planning and development control.	As planning schemes hold statutory policy provisions for land use planning and development control, they are important instruments that can influence access to land for growing food within their jurisdictions.
	Non-statutory (food planning and management)	<p>Food City: City of Melbourne food policy (2012)</p> <ol style="list-style-type: none"> 1. Mornington Peninsula Local Food Strategy (2013) 2. City of Darebin urban food production strategy (2014) 3. Greater Dandenong Regional Food Strategy (2015–2018) 4. Hume City Council Food Policy (2015) 5. Manningham City Council Food Security Plan (2016–2021) 6. City of Darebin Food Security and Nutrition Action Plan (2016–2020) 7. Moreland Food System Strategy (2017) 8. Shire of Cardinia Community Food Strategy (2018–2026) 	Urban food planning instruments are policies voluntarily developed by LGAs interested in managing food-related issues locally.	LGAs use these instruments to devise targets and actions which can potentially impact on the three challenges described in Section 2: the strengthening of local food economies; the nexus between the urban environment, public health, and sustainability; and, the circular management of food resources (land, water and nutrients).

(Continued)

Table 1. Continued.

Scale	Regulatory status	Documents	Scope	Rationale for inclusion in the analysis
		9. City of Yarra Urban Agriculture Strategy (2019-2023)		

4. Results

Overall results show that planning schemes had a marginal contribution to the topics of ‘local food economy’ and ‘nexus between urban environment, public health, and sustainability’. Aspects related to the circular management of food resources were the most covered by both food policies and planning schemes (see [Figure 3](#)). [Table 3](#) provides a summary of the key findings from the document analysis across the three thematic areas. Findings for each of the thematic areas are discussed in more details next.

4.1. Strengthening of local food economies

The idea of strengthening the local food economy was present in all the food policies analysed; however, only six developed their visions by presenting more concrete proposals (City of Melbourne, Greater Dandenong, Manningham City Council, City of Darebin, City of Moreland, Mornington Peninsula). The topics that most proposals mentioned were the use of public procurement, actions to encourage new food businesses and enterprises, the development of food hubs, the creation of links among food businesses, and the creation of a brand for local food products. Most of the planning schemes did not engage with this topic. The two that have done so (City of Yarra and Hume City Council) have only mentioned the need to change the zoning of activity centres to increase local food retailing.

Food policies worldwide often use public procurement to support local businesses and farmers (Candel 2020), and this was present in three of the analysed documents (City of Darebin, City of Melbourne, Greater Dandenong). Public procurement can also support farmers who adopt sustainable production practices. Expanding farming methods aligned with agroecological practices that rely on a diversity of crops to mimic the natural environment is necessary for ensuring environmentally sustainable and healthy diets (Willett et al. 2019). Brazil offers an example of a public procurement strategy that effectively supports agroecological farmers (Wittman and Blesh 2017).

Table 2. Themes and keywords that guided the content analysis.

Themes	Description	Text search keywords
(i) Strengthening of local food economies	Economic activities related to food distribution and retail. The inclusion of aspects related to knowledge of urban food flows, diversification of supply routes and outlets.	Food business; public procurement; food hub; local food; small food business; food retail; social enterprise; alternative food networks.
(ii) Nexus between urban environment, public health, and sustainability	The mention of practices or activities that explored the nexus between urban environment, healthy diets, and sustainability.	Food desert; healthy food; food access; food security; dietary guidelines; food bank; nutrition.
(iii) Circular management of food resources (land, water and nutrients)	The link between food planning and management instruments with the maintenance of agricultural land, water availability, and assurance that food disposal promotes nutrients cycling.	Urban agriculture; food production; food waste; composting; food growth; organic waste.

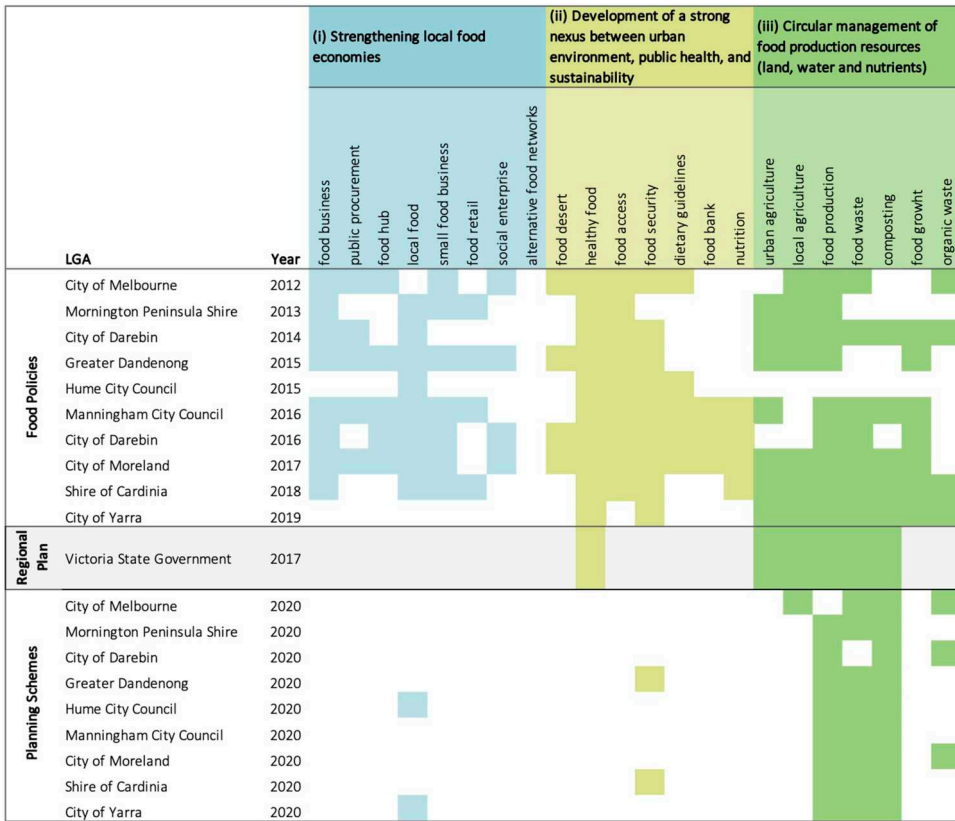


Figure 3. Results of the keywords search for the three thematic areas (see Supplementary Material for further details).

The strategy enables price premiums to be offered to agroecological produce, allowing farmers to transition to more sustainable farming practices while having a reliable income.

Five of the food policies analysed were also concerned with supporting the creation of new food provision models that go beyond retailing outlets such as food hubs (City of Melbourne, Greater Dandenong, Manningham City Council, City of Darebin, City of Moreland). For example, the Greater Dandenong policy mentions the creation of a social enterprise network and a mentoring programme to accelerate this process. Incentives go beyond funding new initiatives to provide an equal starting point for those entering a market with powerful and established players. This is in line with calls for creating specific programmes with regulations shaped to small food businesses that reduce bureaucracy to support new initiatives (Rose 2017). It also concurs with Mah et al.’s (2016) argument that local governments have the authority to explore a range of aspects such as taxes and financial investments to create a supportive environment for new food businesses.

Some urban food policies also recognize the need to increase the connections between local food businesses that work with different activities of the UFS (e.g. the Mornington Peninsula’s Local Food Strategy). The Melbourne Metropolitan Region has a considerable amount of food production and processing activities; however, the Mornington Peninsula’s Local Food Strategy states that many local businesses are not aware of what produce is available locally. Because a resilient local food economy needs to build knowledge of the local food system and connections, Mornington Peninsula has introduced the idea of creating a local food brand as a value-adding strategy aimed at encouraging the consumption of local products.

Explicit actions that support the creation of other intermediary activities compatible with the reality of urban life are still missing and local governments still struggle to adopt instruments

Table 3. Summary of key findings of the document analysis.

Thematic areas	Food policies' main goals	Planning Schemes' main policies	Regional plan main goals
(i) Strengthening local food economies	<ul style="list-style-type: none"> Promote new food business and enterprises (all except City of Yarra). Develop food hubs (City of Melbourne, Greater Dandenong, Manningham City Council, City of Darebin, City of Moreland). Create links among local food business (City of Melbourne, Mornington Peninsula, City of Darebin, Manningham City Council). Use of public procurement (City of Darebin, City of Melbourne, Greater Dandenong). Development of agritourism activities (Mornington Peninsula) 	<ul style="list-style-type: none"> Increase local food retailing (Hume City Council and City of Yarra). 	<ul style="list-style-type: none"> Support existing and potential agribusiness activities.
(ii) Development of a strong nexus between urban environment, public health, and sustainability	<ul style="list-style-type: none"> Develop urban agriculture to increase fresh food access (City of Darebin, Melbourne City) Raising awareness on healthy diets (City of Melbourne, City of Darebin). Enhance and promote the availability of healthy food choices (City of Melbourne, Mornington Peninsula, Greater Dandenong, Hume City Council, City of Darebin) 	<ul style="list-style-type: none"> Increase food provision (City of Yarra) Clear indications for the location of fresh food retailers (Greater Dandenong). Promote food security (Shire of Cardinia). 	–
(iii) Circular management of food production resources (land, water and nutrients)	<ul style="list-style-type: none"> Advocate for planning laws that preserve peri-urban agricultural areas (Melbourne City, Greater Dandenong). Increase food production within the municipality (Melbourne City, Greater Dandenong, City of Darebin, City of Moreland). Promote food waste recycling (Melbourne City, Manningham City Council, City of Darebin, City of Moreland, Shire of Cardinia) Support projects which demonstrate the integration of food growing, waste and water management (City of Darebin, City of Moreland, Shire of Cardinia) 	<ul style="list-style-type: none"> Support new, innovative, or more intensive agriculture and horticulture and soil-based food production (Shire of Cardinia). Protect peri-urban areas for food production (all analysed documents). On-site composting facilities on new buildings where appropriate (all analysed documents except Victoria State Government Melbourne plan). 	<ul style="list-style-type: none"> Protect peri-urban areas for food production.

compatible with evolving business models (Edwards and Davies 2018). This could include food hubs, and initiative that already exists in Melbourne (Vieira, Serrao-Neumann, and Howes 2021). Food hubs are community-based organizations that have the goal of connecting fragmented and dispersed producers and processors with consumers, through a logistical and organizational platform (Berti and Mulligan 2016). These initiatives adopt innovative business models

that build on creating a real connection and relationship between producers and consumers, going beyond a traditional retail store. For example, online platforms and knowledge areas typical of the urban space (e.g. programming, social media management, marketing) can create a bridge between urban consumers and agroecological farmers. The intermediary player develops a market where a consumer can find quality, sustainable, and fair produce, while farmers can focus on food production practices that are environmentally sustainable. Initiatives based on food sharing are another strong trend in Melbourne; these have managed to thrive even without adequate government support (Edwards and Davies 2018). Supporting such networks that work independently from supermarket chains' supply and stocks is fundamental to increasing UFS resilience.

4.2. Development of a nexus between urban environment, public health, and sustainability

All food policies analysed recognized the need to improve health outcomes and ensure access to sustainable diets. Most of them focus on promoting the development of urban agriculture to increase fresh food access (City of Melbourne, Mornington Peninsula, Greater Dandenong, City of Darebin). However, an inconsistency exists between the target of increasing urban agriculture in food policies and planning schemes. Planning schemes are not directly supporting the designation of areas to grow food in urban areas, making it difficult to establish where and when food can be grown in more densely urbanized spaces. To make urban agriculture an effective food security and access strategy, spaces designated for food growth need to be allocated within urban areas.

Food availability is only one aspect of achieving food security. Although agricultural activities may be present, food access and nutrition issues persist in Melbourne Metro. This issue is particularly prominent in the LGAs of Cardinia and Greater Dandenong, among the ones analyzed in our study (Victorian Agency for Health Information 2017). Cardinia is an example of this paradox: a LGA with an agricultural vocation where healthy foods are expensive. Unhealthy diets in Melbourne Metro are often associated with the perception that healthy food is too expensive. The Victorian Agency for Health Information (2017) reported that 37% of Victorians experience food insecurity without hunger, which is a common symptom of unhealthy diets.

The use of urban agriculture to increase food security is a productive approach; however, there are contributions even more accessible to local governments that urban food planning instruments can incorporate. Food education is an example of an aspect that was often missing in urban food planning instruments analysed. The Manningham City Council's Food Security Plan was the only one to propose concrete action targeted at food education for better nutrition. Examples of actions were using the council's communication channels to provide recipes for healthy meals, including healthy eating education in programmes targeting the elderly and children, and council educational programmes teaching how to interpret food labels.

Actions to increase access to fresh food are another example of an activity that local governments can champion. Some urban food planning instruments analysed recognize the need to increase access to fresh food (City of Melbourne, Mornington Peninsula, Greater Dandenong, Hume City Council, City of Darebin), but few elaborate on how this can be achieved. Some introduced the concept of food deserts (City of Melbourne, Greater Dandenong, City of Darebin, City of Moreland) and recognized their existence as a pressing issue. The City of Darebin is a positive example of exploring the dynamics between the built environment and access to fresh food. Darebin's Food Security and Nutrition Action Plan identify the need to consider how transport routes can be improved to increase the accessibility of fresh food outlets. Expanding easy access to drinking water in preference to soft drinks at public events is also one of their goals. The plan also aims to address food deserts in Darebin's planning scheme. The term food desert is not present in the planning scheme, but the document reinforces the need for more fresh food outlets and proposes that new infrastructure complexes foresee a fresh food market space.

Managing food deserts is a pressing issue for local governments, once there is no planning law in Victoria that can intervene in commercially owned areas to limit the setting up of fast food outlets. The planning schemes analysed include requirements for food retailers in new developments, but not all clearly state what kind of food retailers should be allowed. Considering the distribution and characteristics of food outlets by food policies and land use planning instruments is paramount because it can positively or negatively affect urban populations' dietary patterns. Health aspects have been integrated into Australia's planning instruments primarily by incorporating active living (Thompson and McCue 2016). However, the negative impacts of current food spaces on public health are still overlooked (Monteiro et al. 2013). The overconsumption of ultra-processed products by Australians needs to be considered by food planning instruments (Machado et al. 2019). Those ready-to-consumption items are compatible with current lifestyles and are highly profitable, but the low level of whole food ingredients in their composition results in unhealthy products (Monteiro et al. 2013). Increasing access to fresh food and drinking water in urban spaces is a measure that can limit the impacts of the expanded availability of ultra-processed products (Moodie et al. 2013).

4.3. Circular management of food production resources (land, water and nutrients)

The management of environmental resources necessary for food production is another area where urban food planning can contribute. Urban food production, as pointed out by some of the food policies analysed (Melbourne City, Greater Dandenong, City of Darebin, City of Moreland), can increase fresh food access and allow the development of new economic activities. The primary resource inputs required for food growing are water, nutrients, and land availability. In particular, land use decisions are a core business of LGAs in Australia. Although the analysed urban food planning instruments tend to promote the expansion of urban agriculture, this was not the case for planning schemes (see Table 3). Incorporating mechanisms to facilitate urban land access (e.g. identification of landowners and assistance for temporary land access concessions) needs to become part of local government frameworks if food growing in urban and peri-urban areas is to increase. For example, zoning instruments need to consider mixing housing and food growing to enhance local food production in areas that are mostly residential (James and O'Neill 2016). Additionally, peri-urban areas with predominantly farming activities should be protected to avoid price speculation and contain urban sprawl (Cerrada-Serra et al. 2018). In line with this, all planning schemes were concerned with retaining peri-urban agricultural practices and stopping urban sprawl and encroachment towards productive land. However, these policies are constantly under development pressure to meet the increasing demand for housing and accommodate population growth in the Melbourne region.

Land is a crucial resource for growing food but so are water and nutrients. Urban food planning instruments that target urban food growth do not discuss the need for water access for growing food nor how this can be addressed. An exception is the City of Moreland, which provides free or subsidized rainwater harvesting systems to disadvantaged residents who want to grow food. Access to water will increasingly become an issue in Melbourne, with climate change reducing its expected rainfall (City of Melbourne 2022). Food policies that target urban food growing need to develop further this aspect.

Waste management is a crucial aspect of ensuring the maintenance of nutrient cycles, but actions in this space are still nascent. Food policies mention the will to promote food waste recycling (Melbourne City, Manningham City Council, City of Darebin, City of Moreland, Shire of Cardinia), but concrete actions are missing. Policies that introduce organic waste composting place the responsibility on community groups or individuals and present themselves only as supporters. All planning schemes state that new buildings should have on-site composting facilities when appropriate, which transfers the responsibility of food waste management from the council to residents or building owners and tenants. The Victoria State Government's Plan Melbourne Strategy aims to improve organic waste collection and use it to produce electricity. Energy production has more co-benefits

than landfill disposal; however, it neglects the opportunity to recycle nutrients (that are becoming more and more scarce) back into the food cycle. To address this issue, most of the local governments analyzed have recently introduced a new type of bin for food and garden organics (FOGO), and some are in the process of adoption (City of Yarra and Manningham City Council). In certain councils, the bin is an additional service that residents must request and pay for (for example, the Shire of Cardinia). LGAs promote FOGO to divert food waste from landfills and transform it into compost. Due to the novelty of this approach, it is necessary to verify the efficacy of such a system and its capacity to cycle nutrients. The Melbourne region generates most of its food waste in the consumption stage (Pickin et al. 2018), and providing a functional solution could significantly impact nutrient recycling.

Composting is the most accessible first step towards nutrient recycling on UFS, but the loss of nutrients due to organic waste disposal is only part of the problem. The structure of current sewage systems is also impairing nutrient recycling. Typical wastewater management will have to be rethought to encompass nutrient recovery. There is potential for nutrient recovery in the reuse of treated wastewater and extracted solids in urban agriculture; however, the recovery of nutrients directly from the wastewater treatment in biosolids might be more effective (Miller-Robbie, Ramaswami, and Amerasinghe 2017). Wastewater management in the Melbourne region is the responsibility of Melbourne Water (a state-run entity) rather than local governments. Melbourne Water's Sewerage Strategy (Melbourne Water Corporation 2018) aims to implement a resource recovery system, including biosolids which can be used for agricultural purposes. However, enacting this will require a considerable upgrade of the existing infrastructure, which was originally designed as a linear system from collection to disposal.

Agricultural production will experience significant transformations once farming methods based on fossil fuels are no longer desirable (e.g. to meet national carbon emissions targets). This may stress the need to increase opportunities for food growing in urban and peri-urban areas as they become a desirable economic activity, especially using new techniques and methods compatible with current environmental and social demands (James and O'Neill 2016). Some food policies have stated their support for developing projects that demonstrate the integration of food growing, waste, and water management (City of Darebin, City of Moreland, Shire of Cardinia). The planning scheme of the Shire of Cardinia (a council where farming activities are strongly present) has also stated its support for innovative or more intensive agriculture, but without mentioning any techniques.

5. Discussion

The similarities of Melbourne's local food policies with those developed worldwide (Candel, 2020) mean that the findings of our study might also be relevant for other contexts. Our analysis exposed that difficulties still exist in adopting a systemic approach to managing UFS. Even if many local governments in the Melbourne region are aware of the problems surrounding urban food supply and its adequate management's potential to create co-benefits, the implemented examples are still somewhat limited. Our findings resonate with the ones of previous studies. For example, Candel (2020) analyzed food policies from the Milan Urban Food Policy Pact signatories and concluded that few documents contained clear targets and associated time paths. Sibbing, Candel, and Termeer (2021) analyzed food policies from Dutch municipalities and concluded that they do not address a wide range of food challenges and have failed to adopt a systems perspective. The authors observed that food policy documents seem more symbolic than substantial in their quest for systemic urban food management. It is still unclear if such a mismatch between the idea of managing urban food applying a systems perspective and the actions proposed is due to an intentional lack of substance in food policies or a lack of expertise in dealing with such intricate concepts, including UFS and all their relevant dimensions (Sibbing, Candel, and Termeer 2021; Sonnino, Tegoni, and De Cunto 2018).

Our findings contribute to this discussion in multiple ways. First, most LGAs in question follow an international trend by creating a vision focused on tackling global issues at the local level and providing food security (Candel 2020). However, our results showed that the realization of such a vision might be limited by a lack of expertise, scarce resources, or even time to implement the necessary long-term plans. Documents analyzed often mentioned the need to adopt a systemic approach to urban food planning and management. However, the actions proposed are mostly limited to enhancing urban agriculture in households and community food production. The three thematic areas that our study focused on were marginally addressed. When considering the need to strengthen the local food economy, the expansion of urban agriculture as an economic activity is an example of an action that was largely ignored. Previous studies that reported successful cases in United States such as the cities of Portland and Providence highlight the importance of securing access to land for new farmers using spatial planning tools and local policies (Borrelli 2018; Brown and Bush 2018).

In addition to the lack of clear frameworks to facilitate land access, our findings show that the urban food planning instruments analyzed do not address water access and adequate food-management after disposal. Environmental resource management was frequently missing from other food planning instruments, including those from signatories of the Milan Urban Food Policy Pact (Candel 2020; Sibbing, Candel, and Termeer 2021). Ideally, waste and wastewater management should incorporate practices to recycle nutrients from wastewater through reuse or production of by-products for food production in urban areas. Transforming these systems to generate integration with food production is a complex process, and other authors (Drechsel and Karg 2018) analyzing this issue in different geographical locations have also found a lack of activity in this area. Nevertheless, urban food planning and policies need to embrace this challenge by leveraging on the opportunities that urbanization offers to address the challenge of resource recovery (Drechsel and Karg 2018).

When the nexus between urban environment, public health, and sustainability are considered, our results showed a lack of activities focused on increasing access to fresh food and promoting food literacy. Some of the planning instruments propose that new developments include food retail activities, but the current lack of criteria for those may result in the proliferation of fast food or service shops that primarily offer ultra-processed products in suburban areas. This relates to the phenomena that Cohen (2018) observed in East Halem, New York, and called unintentional food zoning. Unintentional food zoning comprises development decisions related to housing or improvement that might also impact neighbourhood food environments. One positive example found among the analyzed Councils in Melbourne is the City of Darebin's plan. Their plan has flagged the need to incorporate food desert analysis in urban planning, representing a more systemic approach to the issue of food insecurity. In the Melbourne Metropolitan Region context, where food availability is not limited, poor diets are likely related to current urban structures. The answers to improving this scenario should consider the experiences of its inhabitants. The management of environmental resources was also largely ignored, which resonates with previous studies (Candel 2020; Sibbing, Candel, and Termeer 2021).

Additionally, the fact that the planning schemes analyzed did not incorporate the systemic approach discussed in food policies might indicate how the debate on UFS needs to be scaled up and be included in land use planning decisions (Sonnino, Tegoni, and De Cunto 2018). There is political interest in addressing the food system's grand challenges locally (Mansfield and Mendes 2013; Moragues-Faus and Morgan 2015), but land use planning decisions are still falling short of enabling it. The two areas (food planning and management, and land use planning) need to work more closely together, especially to avoid policy trade-offs given the predominant non-statutory character of urban food policies.

Finally, the novelty of a UFS approach requires that local governments collect relevant data to create plans adjusted to their local reality (Sonnino, Tegoni, and De Cunto 2018). Improved metrics and data are required to advance urban food planning and management by enabling a more precise quantification of how specific actions can increase food security and the circularity of natural

resources. The lack of data to manage UFS has also been pointed out by Baker (2018) in the case of the city of Toronto. She suggests that food assets mapping is crucial, and this aspect has not been fully considered in planning practice or literature. Food assets include the local food infrastructure that maintains food-secure communities and regions (e.g. food enterprises, markets, retailers, community gardens, urban farms, community gardens, community kitchens) and can be expanded to include waste facilities, which could also spur UFS circularity.

6. Conclusion

This paper focused on the Melbourne Metropolitan Region to investigate how urban food planning and management can address the current challenges of (i) strengthening local food economies; (ii) developing a nexus between urban environment, public health, and sustainability; and, (iii) the circular management of food production resources (land, water and nutrients). Ten statutory and ten non-statutory documents, including plans and strategies, were analysed. Our study contributes to urban food planning and management practice by both identifying policy instruments that have successfully addressed these key challenges, and existing inconsistencies between planning schemes and food policies. Despite specific plans and strategies targeting food issues, overall results showed a range of areas still requiring further development to strengthen the effectiveness of urban food policies. We suggest that city policies should go beyond incentives for urban gardens and explore the potential of new areas of intervention, including the integration of local producers and retailers into urban food planning, the prioritization of healthy fresh food over ultra-processed products, and the integration of composting into waste management.

Promoting the reconnection between local producers, businesses, and consumers and supporting more sustainable methods for growing food are critical steps to creating a strong local food economy and contributing to urban food security. Local governments can assist with this by providing enabling infrastructure (e.g. spaces for food hubs), financial incentives that can create a supportive environment for the emergence of new local food businesses, and regulatory planning mechanisms that encourage the provision and enhancement of ecosystem services for urban residents such as farming activities in peri-urban areas based on sustainable methods.

Improvements that local governments could promote through their policies to strengthen local food economies could include the creation of a brand for local food products, incentives for business to strengthen all UFS related activities (e.g. food disposal, food distribution), and develop more robust programmes to support local food businesses through educational activities and tax incentives. Regarding the nexus between urban environment, public health, and sustainability, local policies could support the increase of opportunities for food processing, distribution, and retail within urban areas. There is also a clear role that land use planning could play in this, including setting out clear designation of urban spaces to support and enable urban agriculture (e.g. identification of landowners and assistance for temporary land access concessions to allow them to grow food), and use planning scheme rules to increase access to healthy foods to improve public health. From the circular management of food production resources perspective, there is a clear need for better schemes that facilitate the recycling of nutrients used in the food cycle. This could include mechanisms that implement composting as part of LGA's organic waste management practices, development of wastewater systems to promote nutrients recover, and advocacy for the use of farming techniques that promote nutrient recycling and water reuse in local food production.

Our study has some limitations. Our analysis focused on the extent to which current urban food planning and management tools in the case study area address key challenges facing UFS, which provides a starting point. However, we did not assess whether proposed actions have led to interventions on the ground. Therefore, future studies could focus on assessing the implementation of such policies, using a multi-year longitudinal analysis that examines the different stages of the implementation process. Future research could also use spatial analysis to assess policy effectiveness. This could include the investigation of spatial configuration changes of urban areas before

and after policy implementation to assess the extent to which policies were conducive to increased urban food production, linkages between urban and rural areas, and the emergence or decline of food deserts. Such spatial analysis could also be compared with public health indicators to identify the scale of food security or otherwise. Future studies could also focus on the impact that proposed new areas of intervention could have on addressing the systemic issues identified in our conceptual framework, including the need for new models of food provision based on urban-rural linkages.

Disclosure statement

No potential conflict of interest was reported by the author(s).

ORCID

Leticia Canal Vieira  <http://orcid.org/0000-0001-5810-8565>

Silvia Serrao-Neumann  <http://orcid.org/0000-0001-9601-4914>

References

- Agriculture Victoria. 2024. "Invest in Victorian Agriculture." <https://invest.agriculture.vic.gov.au/#/map?lat=145.44482994077745&lon=-37.621052472263955&z=6&bm=0&l=ag01:n:100,mb0:y:100,fp3:y:100,mb2:y:100>.
- Allen, T., and P. Prosperi. 2016. "Modeling Sustainable Food Systems." *Environmental Management* 57 (5): 956–975. <https://doi.org/10.1007/s00267-016-0664-8>
- Amato-Lourenço, L. F., R. J. Buralli, G. R. Ranieri, A. H. Hearn, C. Williams, and T. Mauad. 2021. "Building Knowledge in Urban Agriculture: The Challenges of Local Food Production in São Paulo and Melbourne." *Environment, Development and Sustainability* 23 (2): 2785–2796. <https://doi.org/10.1007/s10668-020-00636-x>
- Anderson, M. D. 2015. "The Role of Knowledge in Building Food Security Resilience Across Food System Domains." *Journal of Environmental Studies and Sciences* 5 (4): 543–559. <https://doi.org/10.1007/s13412-015-0311-3>.
- Baker, L. 2018. "Food Asset Mapping in Toronto and Greater Golden Horseshoe Region." In *Integrating Food Into Urban Planning*, edited by Y. Cabannes, and C. Marocchino. London: UCL Press; Rome: FAO. <https://doi.org/10.14324/111.9781787353763>.
- Bedore, M. 2010. "Just Urban Food Systems: A New Direction for Food Access and Urban Social Justice: Just Urban Food Systems." *Geography Compass* 4 (9): 1418–1432. <https://doi.org/10.1111/j.1749-8198.2010.00383.x>.
- Béné, C., P. Oosterveer, L. Lamotte, I. D. Brouwer, S. de Haan, S. D. Prager, E. F. Talsma, and C. K. Khoury. 2019. "When Food Systems Meet Sustainability – Current Narratives and Implications for Actions." *World Development* 113: 116–130. <https://doi.org/10.1016/j.worlddev.2018.08.011>.
- Berno, T. 2017. "Social Enterprise, Sustainability and Community in Post-Earthquake Christchurch: Exploring the Role of Local Food Systems in Building Resilience." *Journal of Enterprising Communities: People and Places in the Global Economy* 11: 149–165. <https://doi.org/10.1108/JEC-01-2015-0013>.
- Berry, E. M., S. Dernini, B. Burlingame, A. Meybeck, and P. Conforti. 2015. "Food Security and Sustainability: Can one Exist Without the Other?" *Public Health Nutrition* 18 (13): 2293–2302. <https://doi.org/10.1017/S136898001500021X>.
- Berti, G., and C. Mulligan. 2016. "Competitiveness of Small Farms and Innovative Food Supply Chains: The Role of Food Hubs in Creating Sustainable Regional and Local Food Systems." *Sustainability* 8 (7): 616.
- Borrelli, N. 2018. "Connecting Food Systems and Urban Planning: The Experience of Portland, Oregon." In *Integrating Food Into Urban Planning*, edited by Y. Cabannes, and C. Marocchino. London: UCL Press; Rome: FAO. <https://doi.org/10.14324/111.9781787353763>.
- Bowen, G. A. 2009. "Document Analysis as a Qualitative Research Method." *Qualitative Research Journal* 9 (2): 27–40. <https://doi.org/10.3316/QRJ0902027>.
- Brown, K., and S. D. Bush. 2018. "Edible Providence: Integrating Local Food Into Urban Planning." In *Integrating Food Into Urban Planning*, edited by Y. Cabannes, and C. Marocchino. London: UCL Press; Rome: FAO. <https://doi.org/10.14324/111.9781787353763>.
- Candel, J. J. L. 2020. "What's on the Menu? A Global Assessment of MUFPP Signatory Cities' Food Strategies." *Agroecology and Sustainable Food Systems* 44 (7): 919–946. <https://doi.org/10.1080/21683565.2019.1648357>.
- Carey, R., J. Sheridan, K. Larsen, and S. Candy. 2016. "Melbourne's Food Future: Planning a Resilient City Food Bowl." <https://policycommons.net/artifacts/10770567/melbournes-food-future/11648744/>.
- Cerrada-Serra, P., L. Colombo, D. Ortiz-Miranda, and S. Grandó. 2018. "Access to Agricultural Land in Peri-Urban Spaces: Social Mobilisation and Institutional Frameworks in Rome and Valencia." *Food Security* 10 (6): 1325–1336. <https://doi.org/10.1007/s12571-018-0854-8>.

- City of Melbourne. 2022. "Climate Change Impacts on Melbourne." Accessed May 16, 2022. <https://www.melbourne.vic.gov.au/about-council/vision-goals/eco-city/Pages/adapting-to-climate-change.aspx>.
- Cohen, N. 2018. "Unintentional Food Zoning: A Case Study of East Harlem, New York." In *Integrating Food Into Urban Planning*, edited by Y. Cabannes, and C. Marocchino. London: UCL Press; Rome: FAO. <https://doi.org/10.14324/111.9781787353763>.
- Cordell, D., J.-O. Drangert, and S. White. 2009. "The Story of Phosphorus: Global Food Security and Food for Thought." *Global Environmental Change* 19 (2): 292–305. <https://doi.org/10.1016/j.gloenvcha.2008.10.009>.
- Cordell, D., A. Rosemarin, J. J. Schröder, and A. L. Smit. 2011. "Towards Global Phosphorus Security: A Systems Framework for Phosphorus Recovery and Reuse Options." *Chemosphere* 84 (6): 747–758. <https://doi.org/10.1016/j.chemosphere.2011.02.032>.
- Cretella, A. 2016. "Urban Food Strategies. Exploring Definitions and Diffusion of European Cities' Latest Policy Trend." In *Research in Rural Sociology and Development*, edited by K. Andersson, S. Sjöblom, L. Granberg, P. Ehrström, and T. Marsden, 303–323. Emerald Group Publishing Limited. <https://doi.org/10.1108/S1057-192220160000023013>.
- Debru and Brand. 2019. "Theoretical Approaches for Effective Sustainable Urban Food Policymaking." In *Designing Urban Food Policies: Concepts and Approaches*, edited by N. Bricas, D. Conaré, B. Daviron, J. Debru, L. Michel, and C. T. Soulard, 75–105. Cham: Springer. <https://doi.org/10.1007/978-3-030-13958-2>.
- Drechsel, P., and H. Karg. 2018. "Food Flows and Waste: Planning for the Dirty Side of Urban Food Security." In *Integrating Food Into Urban Planning*, edited by Y. Cabannes, and C. Marocchino. London: UCL Press; Rome: FAO. <https://doi.org/10.14324/111.9781787353763>.
- Dubbeling, M., C. Bucatariu, G. Santini, C. Vogt, and K. Eisenbeiz. 2016. *City Region Food Systems and Food Waste Management*.
- Edwards, F., and A. R. Davies. 2018. "Connective Consumptions: Mapping Melbourne's Food Sharing Ecosystem." *Urban Policy and Research* 36 (4): 476–495. <https://doi.org/10.1080/08111146.2018.1476231>.
- Ericksen, P. J. 2008. "Conceptualizing Food Systems for Global Environmental Change Research." *Global Environmental Change* 18 (1): 234–245. <https://doi.org/10.1016/j.gloenvcha.2007.09.002>.
- FAO. 2006. *The State of Food and Agriculture, 2006: Food aid for Food Security?* Rome: Food and Agriculture Organization.
- Forster, T., G. Santini, D. Edwards, K. Flanagan, and M. Taguchi. 2015. *Strengthening Urban Rural Linkages Through City Region Food Systems*. Rome: FAO.
- Garnett, T. 2011. "Where are the Best Opportunities for Reducing Greenhouse gas Emissions in the Food System (Including the Food Chain)?" *Food Policy* 36: S23–S32. <https://doi.org/10.1016/j.foodpol.2010.10.010>
- Gordon, L. J., V. Bignet, B. Crona, P. J. G. Henriksson, T. Van Holt, M. Jonell, T. Lindahl, et al. 2017. "Rewiring Food Systems to Enhance Human Health and Biosphere Stewardship." *Environmental Research Letters* 12 (10): 100201. <https://doi.org/10.1088/1748-9326/aa81dc>.
- Hendriks, S. L. 2015. "The Food Security Continuum: A Novel Tool for Understanding Food Insecurity as a Range of Experiences." *Food Security* 7 (3): 609–619. <https://doi.org/10.1007/s12571-015-0457-6>.
- Hinrichs, C. 2016. "Fixing Food with Ideas of "Local" and "Place"." *Journal of Environmental Studies and Sciences* 6 (4): 759–764. <https://doi.org/10.1007/s13412-015-0266-4>
- Jacobi, J., S. Mukhovi, A. Llanque, D. Toledo, C. I. Speranza, F. Käser, H. Augstburger, J. M. F. Delgado, B. P. Kiteme, and S. Rist. 2019. "Actor-specific Risk Perceptions and Strategies for Resilience Building in Different Food Systems in Kenya and Bolivia." *Regional Environmental Change* 19 (3): 879–892. <https://doi.org/10.1007/s10113-018-1448-x>.
- James, S. W., and P. M. O'Neill. 2016. "Planning for Peri-Urban Agriculture: A Geographically-Specific, Evidence-Based Approach from Sydney." *Australian Geographer* 47 (2): 179–194. <https://doi.org/10.1080/00049182.2015.1130676>.
- Jennings, S., J. Cottee, T. Curtis, and S. Miller. 2015. *Food in an Urbanised World: The Role of City Region Food Systems in Resilience and Sustainable Development*. Rome: International Sustainability Unit, FAO.
- Kasper, C., J. Brandt, K. Lindschulte, and U. Giseke. 2017. "The Urban Food System Approach: Thinking in Spatialized Systems." *Agroecology and Sustainable Food Systems*, <https://doi.org/10.1080/21683565.2017.1334737>.
- Kato, Y., and L. McKinney. 2015. "Bringing Food Desert Residents to an Alternative Food Market: A Semi-Experimental Study of Impediments to Food Access." *Agriculture and Human Values* 32 (2): 215–227. <https://doi.org/10.1007/s10460-014-9541-3>
- Kirschenmann, F. L. 2008. "Food as Relationship." *Journal of Hunger & Environmental Nutrition* 3 (2-3): 106–121. <https://doi.org/10.1080/19320240802243134>
- Koç, M. 2010. *Sustainability: A Tool for Food System Reform? In: Imagining Sustainable Food Systems: Theory and Practice*. Oxfordshire: Routledge.
- Kuusaana, E. D., and J. A. Eledi. 2015. "As the City Grows, Where do the Farmers go? Understanding Peri-Urbanization and Food Systems in Ghana - Evidence from the Tamale Metropolis." *Urban Forum* 26 (4): 443–465. <https://doi.org/10.1007/s12132-015-9260-x>.

- Machado, P. P., E. M. Steele, M.L. da C. Louzada, R. B. Levy, A. Rangan, J. Woods, T. Gill, G. Scrinis, and C. A. Monteiro. 2019. "Ultra-processed Food Consumption Drives Excessive Free Sugar Intake among all age Groups in Australia." *European Journal of Nutrition*, <https://doi.org/10.1007/s00394-019-02125-y>.
- Mah, C. L., B. Cook, K. Rideout, and L. M. Minaker. 2016. "Policy Options for Healthier Retail Food Environments in City-Regions." *Canadian Journal of Public Health* 107 (S1): eS64–eS67. <https://doi.org/10.17269/CJPH.107.5343>.
- Mansfield, B., and W. Mendes. 2013. "Municipal Food Strategies and Integrated Approaches to Urban Agriculture: Exploring Three Cases from the Global North." *International Planning Studies* 18 (1): 37–60. <https://doi.org/10.1080/13563475.2013.750942>.
- Matacena, R. 2016. "Linking Alternative Food Networks and Urban Food Policy: A Step Forward in the Transition Towards a Sustainable and Equitable Food System?" *International Review of Social Research* 6. <https://doi.org/10.1515/irsr-2016-0007>.
- Maxwell, S., and R. Slater. 2003. "Food Policy Old and New: Food Policy Old and New." *Development Policy Review* 21 (5-6): 531–553. <https://doi.org/10.1111/j.1467-8659.2003.00222.x>.
- Melbourne Water Corporation. 2018. *Melbourne Sewerage Strategy*. Accessed: May 22, 2024. <https://www.melbournewater.com.au/media/6651/download>.
- Miller-Robbie, L., A. Ramaswami, and P. Amerasinghe. 2017. "Wastewater Treatment and Reuse in Urban Agriculture: Exploring the Food, Energy, Water, and Health Nexus in Hyderabad, India." *Environmental Research Letters* 12 (7): 075005. <https://doi.org/10.1088/1748-9326/aa6bfc>.
- Moench, M. 2014. "Experiences Applying the Climate Resilience Framework: Linking Theory with Practice." *Development in Practice* 24 (4): 447–464. <https://doi.org/10.1080/09614524.2014.909385>.
- Monteiro, C. A., J.-C. Moubarac, G. Cannon, S. W. Ng, and B. Popkin. 2013. "Ultra-processed Products are Becoming Dominant in the Global Food System: Ultra-Processed Products: Global Dominance." *Obesity Reviews* 14 (S2): 21–28. <https://doi.org/10.1111/obr.12107>.
- Moodie, R., D. Stuckler, C. Monteiro, N. Sheron, B. Neal, T. Thamarangsi, P. Lincoln, and S. Casswell. 2013. "Profits and Pandemics: Prevention of Harmful Effects of Tobacco, Alcohol, and Ultra-Processed Food and Drink Industries." *The Lancet* 381 (9867): 670–679. [https://doi.org/10.1016/S0140-6736\(12\)62089-3](https://doi.org/10.1016/S0140-6736(12)62089-3).
- Moragues-Faus, A., and K. Morgan. 2015. "Reframing the Foodscape: The Emergent World of Urban Food Policy." *Environment and Planning A: Economy and Space* 47 (7): 1558–1573. <https://doi.org/10.1177/0308518X15595754>.
- Pereira, L. M., and S. Ruysenaar. 2012. "Moving from Traditional Government to new Adaptive Governance: The Changing Face of Food Security Responses in South Africa." *Food Security* 4 (1): 41–58. <https://doi.org/10.1007/s12571-012-0164-5>.
- Pickin, J., P. Randell, J. Trinh, and B. Grant. 2018. National Waste Report 2018 126.
- Roggema, R., and J. Spangenberg. 2015. "Towards New Urban Networks for Linking the Urban Food Production-Preparation-consumption Chain." In: 51st ISOCARP Congress 2015.
- Rose, N. 2017. "Community Food Hubs: An Economic and Social Justice Model for Regional Australia?" *Rural Society* 26 (3): 225–237. <https://doi.org/10.1080/10371656.2017.1364482>.
- Ruel, M. T., J. Garrett, S. Yosef, and M. Olivier. 2017. "Urbanization, Food Security and Nutrition." *Nutr Health Dev World*, 705–735. https://doi.org/10.1007/978-3-319-43739-2_32.
- Russell, S. E., and C. P. Heidkamp. 2011. "Food Desertification: The Loss of a Major Supermarket in New Haven, Connecticut." *Applied Geography* 31 (4): 1197–1209. <https://doi.org/10.1016/j.apgeog.2011.01.010>.
- Shafiee-Jood, M., and X. Cai. 2016. "Reducing Food Loss and Waste to Enhance Food Security and Environmental Sustainability." *Environmental Science & Technology* 50 (16): 8432–8443. <https://doi.org/10.1021/acs.est.6b01993>.
- Sibbing, L., J. Candel, and K. Termeer. 2021. "A Comparative Assessment of Local Municipal Food Policy Integration in the Netherlands." *International Planning Studies* 26 (1): 56–69. <https://doi.org/10.1080/13563475.2019.1674642>.
- Smit, W. 2016. "Urban Governance and Urban Food Systems in Africa: Examining the Linkages." *Cities* 58: 80–86. <https://doi.org/10.1016/j.cities.2016.05.001>.
- Smith, K., and G. Lawrence. 2018. "From Disaster Management to Adaptive Governance? Governance Challenges to Achieving Resilient Food Systems in Australia." *Journal of Environmental Policy & Planning* 20 (3): 387–401. <https://doi.org/10.1080/1523908X.2018.1432344>.
- Sonnino, R. 2016. "The new Geography of Food Security: Exploring the Potential of Urban Food Strategies." *The Geographical Journal* 182 (2): 190–200. <https://doi.org/10.1111/geoj.12129>.
- Sonnino, R., C. L. S. Tegoni, and A. De Cunto. 2018. "The Challenge of Systemic Food Change: Insights from Cities." *Cities*, <https://doi.org/10.1016/j.cities.2018.08.008>.
- State government of Victoria. 2022. Accessed May 23, 2022. <https://www.invest.vic.gov.au/news-and-events/news/2019/september/melbourne-one-of-the-worlds-most-liveable-cities>.
- Steele, W., and C. Legacy. 2017. "Critical Urban Infrastructure." *Urban Policy and Research* 35 (1): 1–6. <https://doi.org/10.1080/08111146.2017.1283751>.
- Thompson, S., and P. McCue. 2016. "Healthy Planning: An Evolving Collaborative Partnership." *Urban Policy and Research* 34 (1): 73–89. <https://doi.org/10.1080/08111146.2016.1140032>.

- Victorian Agency for Health Information. 2017. "Challenges to Healthy Eating – Food Insecurity in Victoria: Findings from the 2014 Victorian Population Health Survey, State of Victoria, Melbourne." <http://bettersafercare.vic.gov.au/food-insecurity>.
- Vieira, L. C., S. Serrao-Neumann, and M. Howes. 2021. "Daring to Build Fair and Sustainable Urban Food Systems: A Case Study of Alternative Food Networks in Australia." *Agroecology and Sustainable Food Systems* 45 (3): 344–365. <https://doi.org/10.1080/21683565.2020.1812788>
- Vieira, L. C., S. Serrao-Neumann, M. Howes, and B. Mackey. 2018. "Unpacking Components of Sustainable and Resilient Urban Food Systems." *Journal of Cleaner Production* 200: 318–330. <https://doi.org/10.1016/j.jclepro.2018.07.283>
- Warshawsky, D. N. 2015. "The Devolution of Urban Food Waste Governance: Case Study of Food Rescue in Los Angeles." *Cities* 49: 26–34. <https://doi.org/10.1016/j.cities.2015.06.006>.
- Willett, W., J. Rockström, B. Loken, M. Springmann, T. Lang, S. Vermeulen, T. Garnett, et al. 2019. "Food in the Anthropocene: The EAT–Lancet Commission on Healthy Diets from Sustainable Food Systems." *The Lancet*, [https://doi.org/10.1016/S0140-6736\(18\)31788-4](https://doi.org/10.1016/S0140-6736(18)31788-4).
- Wittman, H., and J. Blesh. 2017. "Food Sovereignty and Fome Zero: Connecting Public Food Procurement Programmes to Sustainable Rural Development in Brazil." *Journal of Agrarian Change* 17 (1): 81–105. <https://doi.org/10.1111/joac.12131>.
- Zasada, I. 2011. "Multifunctional Peri-Urban Agriculture—A Review of Societal Demands and the Provision of Goods and Services by Farming." *Land Use Policy* 28 (4): 639–648. <https://doi.org/10.1016/j.landusepol.2011.01.008>.