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EDITORIAL

Open Access Journal

Why Is the Study of Food Environments Still Relevant?

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Abstract

Food environments are the point of intersection where people engage with the food system. As such, they are a key consideration for food policy and governance in countries across the world. This collection of articles draws upon research conducted in a range of countries and predominantly, but not exclusively, urban settings. Research presented here expands on the way food environments have traditionally been explored in academic studies since the 1990s, introducing novel methodologies for assessment and incorporating the digital food environment, as well as food aid resources. Contemporary research must contend with the theoretical challenge of conceptualizing food environments in relation to wider social forces and changes. The more practical challenge is to inform improvements to neighbourhood food environments whilst avoiding the associated propensity to further perpetuate fragmented and short-term responses to food inequalities.

Keywords

digital food environment; food aid; food environment; food policy; food system

1. Introduction

The rise in obesity prevalence in recent decades has increased interest in the food environment as a possible causal factor, given its potential to shape dietary behaviours (McKinnon et al., 2009). In fact, food environments likely contribute to the increasing epidemic of non-communicable diseases over and above individual factors such as knowledge, skills, and motivation (Story et al., 2008).

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The metaphor and study of "food deserts" is one idea that gained traction due to the compelling imagery and simplicity of the phrase—an area in which healthy food is sparse, providing a relatively uncritical starting point for much of the food environment research which followed. A food desert is hypothesised as a location, often in relatively deprived urban areas, where healthy food is practically unobtainable due to cost or an absence of retail food outlets (Macintyre et al., 2008). The underlying logic for public health practitioners is that a lack of access to healthy affordable food in an area would lead to poorer population diet, and by extension, diet-related health. Food deserts research has, ultimately, spawned a range of metaphoric typologies of food environments (Tonumaipe'a et al., 2021). This has included food oases and mirages (Short et al., 2007), food swamps (Bridle-Fitzpatrick, 2015), food havens (Tonumaipe'a et al., 2021), and food apartheid (de Souza, 2024).

2. Theoretical Developments and Practical Challenges

Research on food environments, to date, rarely analyses food environments in relation to wider and deeper transformative dynamics (Cifuentes & Sonnino, 2024). Given the social and political dimensions of food environments, it is now tacitly accepted that they overlap and intertwine. As inequality and social divisions widen, attention has rightly been given to conceptualizing food environments (or even foodscapes and foodways) as relational spaces that can be specific to particular groups. This considers not only the physical food environment, but the social norms, disadvantage, governance, economic constraints, and values that shape how different groups are able to interact with it. Thus, researchers have defined and explored child and adolescent food environments (Rozas & Busse, 2022), those of older adults (Dickinson et al., 2022), poverty foodscapes (Sedelmeier, 2023), socio-economic class-based foodscapes (Cervigni et al., 2022), and immigrant foodways (Allison, 2020). Taken collectively, the overall effect is that of a series of multi-layered food environments that may both overlap in physical settings and intersect around identities and vulnerabilities. While these developments are theoretically challenging, a return to the dietary public health concerns that drive food environments research reminds us that complexity (and sometimes even perceived complexity) can hinder organised policy efforts to improve food environments (Majowicz et al., 2016). Goodman (2016) provides a note of caution, appealing to scholars to temper, or at least match, explorations of ontology and theory with critical and practical concerns around inequality and food justice (Goodman, 2016). And so, this thematic issue deals not only with conceptualizations of the food environment, but also the more pragmatic topics of definition and measurement.

Multiple current global crises—such as the pandemic, climate change, and military conflicts—bring devastating cumulative impacts and have been described as a state of global polycrisis (Lawrence et al., 2024). The food system has been implicated as being both negatively impacted by polycrisis *and* a contributing factor in its emergence (Assadourian, 2025). Food environments are the point of intersection where people engage with the food system. They are rapidly changing in terms of rising food insecurity and obesity, and worsening health and environmental outcomes (Goh et al., 2024). Despite this, the realization of global goals to transform food systems is hampered by market priorities, a lack of accountability and oversight, and an absence of platforms for multisector partnerships (Reeve et al., 2024). In the meantime, generating evidence and intervening at the regional and local levels remain the most immediate ways to address the challenges posed by food system failures. A cohesive research agenda is needed to facilitate food environment research and inform action in settings across the globe (Turner et al., 2018). It is in this spirit that the current thematic issue invites new contributions to the debates.

3. Structure of the Thematic Issue

A concern with health and social inequalities is at the core of food environment research, with food aid outlets and organizations a seemingly irreversible feature of contemporary urban food environments (Thompson et al., 2019). In this vein, Luger and van der Meij (2025) undertake a theoretically informed examination of the complexities of food insecurity in Amsterdam Noord, proposing a model of infrastructural violence. Food banks occupy complex positions as institutions that aim to mitigate the impacts of social and economic disadvantage but, ultimately, are implicated in their reproduction (Luger & van der Meij, 2025). García and Lambert (2025) provide an alternate take on infrastructure. Their work in Santiago, Chile, shifts the focus from infrastructures as drivers of food insecurity to social infrastructures that actively *resist* food insecurity (García & Lambert, 2025). Dickinson (2025) then moves us on to consider how changes to food environments affect particular groups, especially the elderly. She observes that the transformative dynamics of Covid cemented the expectation that the food aid system, rather than the state, is responsible for trying to tackle food insecurity (Dickinson, 2025).

Following these critical contributions on food insecurity, Barry et al. (2025) bring the readers' attention to the ongoing challenge of managing food environments and the need to give greater consideration to "place" in food systems policies (Sonnino & Milbourne, 2022). The challenges of managing food environments extend to measurement, which is problematic because without measurement the scale of any inequity in access—to healthy food, to food aid— is unknown (Smith & Thompson, 2022). In this vein, Gómez-Escoda and Moncusí (2025) present a novel quantitative approach to studying pedestrian movement and measuring proximity related to fresh food markets in urban food environments in Barcelona, Spain. The articles on food environment management finish with an account of co-creating healthy and sustainable food system interventions in local food-system labs in African cities. The authors demonstrate how food environments change and evolve at a micro-level, a topic often overlooked in the literature more broadly (Vermue et al., 2025).

One of the most striking recent macro-developments in food environments research is the transformative process of digitalisation (Cifuentes & Sonnino, 2024). Underpinned by qualitative fieldwork in Norway, Granheim et al. (2025) introduce the digital food environment and reflect on emerging issues for transforming governance and power asymmetries. Farhangi et al. (2025) then pick out a specific component of digitalisation, digital food platforms, which are challenging conventional planning and regulatory frameworks and changing urban infrastructure in Sweden. Evidently, developments in the digital food environment have consequences for physical and material food infrastructure and practice (Farhangi et al., 2025). Dark kitchens, as non-customer-facing establishments where meals are mass-prepared and sold exclusively online (da Cunha et al., 2024), can be seen as the ultimate urban manifestation of virtual food practices. Keeble et al.'s (2025) research on meal delivery platforms in Flanders, Belgium, explains how these sites are potential venues for poor food safety practices, and problematic for urban planning and governance across countries.

The final set of articles takes us from physical/digital dichotomies to rural/urban ones. In an increasingly globalized and interconnected food system, can urban food environments still only be found in urban areas? Neri (2025) opens the debate by introducing the notion of "urban foods" (typically processed foods) that proliferate beyond the urban built environment. Her fieldwork in rural Bhutan examines how urban foods

make their way into rural contexts and rural lives (Neri, 2025). Simón-Rojo et al. (2025) address rural/urban relations in the alternate directionality: starting with the premise that rural areas feed urban ones, often to their own detriment. The article models food supply capacity at the local level to theorize how the burden of urban food demand might impact upon local production (Simón-Rojo et al., 2025). Urbanicity and the associated nutrition transition is a long-standing dietary public health concern (Bellows et al., 2024). In this thematic issue, our contributors go some way to addressing the lack of focus on the rural, rather than urban, side of the transition.

4. Conclusion

Food environments are, among other things, the material, embodied expression of wider social forces (Luger & van der Meij, 2025). Collectively, the articles in this thematic issue highlight some of the influential factors that are changing the way we think about and research food environments, namely: food insecurity, managing food environments, digitalization, and the blurring of rural and urban distinctions. The enduring challenge for many of those working in this field is to continue to take and create opportunities to improve local food environments and, at the same time, avoid the associated propensity of local approaches to further perpetuate the fragmented nature of contemporary responses to food system failure (Smith & Thompson, 2022; Thompson et al., 2025).

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Conflict of Interests

The authors declare no conflict of interests.

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ARTICLE

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Food Insecurity in Amsterdam Noord: Experiences of Infrastructural Violence in an Urban Food Environment

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Abstract

Urban food insecurity in high-income countries is rising, and its health outcomes and determinants have been well documented. There are, however, limited qualitative, place-based studies of how people become, or remain, food insecure, especially in EU cities. This article introduces infrastructural violence to explore the complexities of food insecurity and its underlying (infra)structural causes in the urban food environment of Amsterdam's northern city district, Noord, since the Covid-19 pandemic. We build on interviews (2023–2024) with 28 food bank users, volunteers, funders and network representatives, social workers, and municipal staff, carried out in a community geography project. Our findings show a complex interplay of food retail, urban development, welfare, and community food bank infrastructures. Key findings are that urban development affects food security in various ways, and that welfare and community food bank infrastructures, which ideally alleviate food insecurity, can, in fact, exclude people from accessing healthy and affordable food and cause additional harms of administrative burdens, fear, and shame. We further trace the identified infrastructures as place-based embodiments of wider structures, variably including: housing marketization, supermarket corporatization, historical relations between residents and the state, welfare bureaucratisation, social service decentralization, and austerity politics. This study illuminates the (infra)structural complexities underpinning food insecurity in a changing urban food environment, and discusses their implications for urban food governance research and policymaking.

Keywords

Amsterdam; community geography; food insecurity; infrastructural violence; structural violence; urban food environment

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1. Introduction

A lack of food security—food insecurity—is on the rise in high-income countries (Davis & Geiger, 2017; cf. Food and Agricultural Organization of the United Nations, 2020). The Food and Agricultural Organization of the United Nations (2024, p. 55) has long defined food *security* as occurring when all people always "have physical, social, and economic access to safe and nutritious food," and distinguishes four food security dimensions: (1) the physical *availability* of such food; 2) people's *physical* and *economic access* to such food; (3) people's ability to *utilize* food that is available and accessible to them; and (4) the *stability* of the first three factors over time. In 2023, 9.5% of the population in the European Union could not afford a proper meal, 1.2% percentage points higher than in 2022 (Eurostat, 2024). This means that more people struggle with an uncertain or limited availability of, or access to, safe and nutritious food (Loopstra, 2018; O'Connor et al., 2016)—important, as food insecurity is connected to a range of observable and experienced physical (e.g., Seligman et al., 2010; Seligman & Schillinger, 2010) and mental health challenges (Frongillo et al., 2017; A. D. Jones, 2017), disproportionally affecting those already living in vulnerable or marginalized situations (e.g., Garthwaite et al., 2015).

Food environment research has mainly studied how limited food availability or physical access to food contributes to food insecurity (Beaulac et al., 2009; see also Fitzpatrick et al., 2016; Jiao et al., 2012). Yet, food insecurity can be caused by various other, notably economic, drivers. This is especially relevant in European cities, where economic rather than physical access affects dietary patterns (Helbich et al., 2017; Shaw, 2006). Even in "food deserts" where food is more sparsely available, cost rather than distance or knowledge can limit access to healthy foods (Alkon et al., 2013). Indeed, income and poverty (Darmon & Caillavet, 2017; Ihab et al., 2015; Sassi, 2018) and unemployment (Frongillo et al., 2017; M. D. Smith et al., 2017) significantly determine food insecurity. Because people in cities are relatively dependent on economic food access (Frongillo et al., 2017; Loopstra, 2018; Ruel et al., 2010; M. D. Smith et al., 2017), they are especially prone to food insecurity (Carter et al., 2014; Tacoli, 2019).

While food unavailability and limited access are now generally well established food insecurity drivers, limited attention has been given to their place-based manifestations and/or exacerbations, i.e., those related to a particular location, like a neighbourhood or city district (D. Smith & Thompson, 2022). For example, if a cost of living crisis already impacts economic food access, more "downstream barriers," like social service opening hours or interpersonal relationships between service recipients and social workers, can further restrict or affect people's financial means to access food. When studies do focus on food insecurity in a certain place, for instance, a neighbourhood, they tend to be "out-of-focus in relation to critical understanding of food insecurity as a phenomenon that is produced" (Page-Reeves et al., 2017, p. 21) by both large-scale drivers and downstream barriers. So, research on food insecurity, food environments and the city is needed that focuses on the underlying causes of food insecurity within their place-based context (Odoms-Young et al., 2024; D. Smith & Thompson, 2022; cf. Vonthron et al., 2020).

This article thus explores food insecurity and its place-based causes in the northern district of Amsterdam: Noord. Its food environment has been changing since the Covid-19 pandemic, seeing new community food banks emerge, while undergoing (re-)developments and gentrification. Moving away from the literature's methodological and empirical tendencies to focus on the lived experiences of specific food insecure demographics (e.g., Johnson et al., 2020; Lombardozzi et al., 2021), the goal of this article is to qualitatively understand both food insecurity and its causes from the perspectives of diverse stakeholders with (lived)

experiences of how people in Noord become or remain food insecure. We build on semi-structured interviews (2023–2024) with 28 interviewees carried out during the first year of a community geography project. We zoom in on food insecurity as the result of limited availability and access to sufficient nutritious food, and people's subsequent reliance on (local) welfare provision and community food banks.

Theoretically, we build on recent studies that see food insecurity through a "structural violence" lens (Bruck & Garthwaite, 2021; Johnson et al., 2020; Lindberg et al., 2023; Whittle et al., 2015). While the concept brings out how suffering, like food insecurity, and responses to it, like food charity, are structured by wider social arrangements, it has barely been used in European health-related research (Macassa et al., 2021). To address some of its analytical problems, we draw on the related concept of *infra*structural violence—seeing infrastructures as "things" and "relations between things" that can both reflect and reinforce structural violence—which to our knowledge has not yet been applied to food insecurity. This article thus empirically asks: What are stakeholder perspectives on how infrastructures in *Amsterdam* Noord (re)produce food insecurity? In the discussion, we then trace how the identified infrastructures reflect and reinforce wider, inequitable social arrangements—and how they can alternatively be turned into care-full and just infrastructures (Alam & Houston, 2020; Williams, 2022).

2. Food Insecurity as (Infra)Structural Violence

2.1. Structural Violence and Food Insecurity

Structural violence describes how social arrangements, like economic, legal, political, and cultural systems, disproportionally impact people in vulnerable groups and prevent them from attaining justice, wellbeing, and healthy lives (Jackson & Sadler, 2022). These "structures" can be seen as "violent" because they can limit people's ability to meet their basic needs and thus do harm. Coined by Johan Galtung in 1969, it was popularized by anthropologist Paul Farmer who described how social arrangements bring about harms which "are *structural* because they are embedded in the political and economic organization of our social world" and "they are *violent* because they cause injury" (Farmer et al., 2006, p. 1686). Structural violence mainly refers to indirect, invisible, yet omnipresent harms, contrary to physical violence that "shows," and might seem a natural part of the social world (Rylko-Bauer & Farmer, 2017).

Structural violence has been increasingly applied in urban studies, for example, to understand problematic welfare programs (Bruck & Garthwaite, 2021) and state neglect of neighbourhoods (Apostolopoulou & Liodaki, 2025). The concept has, to our knowledge, not been used to study (urban) food environments, but has sparsely been applied to food insecurity. Whittle et al. (2015) examined the structural violence of urban policies in San Francisco stimulating gentrification and neglecting disability facilities, as they contribute to food insecurity, poverty and harmful coping strategies for low-income people with HIV/AIDS. Also in San Francisco, Johnson et al. (2020) studied how insufficient benefits and limited healthy food availability led to food insecurity among formerly homeless young adults, compounded by feelings of shame and stigma. Structural violence has also been used to describe harmful food bank responses to food insecurity: Lindberg et al. (2023, p. 194) studied the "controlling, demeaning and depriving violence practices," such as subjugation, humiliation, and stigmatization, of Australian food banks and social services (see also Bruck & Garthwaite, 2021). To clarify, whereas some (Lindberg et al., 2023; Whittle et al., 2015) see food insecurity as a *manifestation* of structural violence, others (Bruck & Garthwaite, 2021; Johnson et al., 2020) see

food insecurity as a *component* of structural violence. These perspectives do not exclude one another. Here, therefore, we consider food insecurity both a symptom of violent structures and mechanism of associated harms.

Despite possibly helping to "understand the distal causal factors that can plausibly explain…poor health patterns and inequities" (Lindberg et al., 2023, p. 186), structural violence is critiqued for being too broad (Jackson & Sadler, 2022). It often ill-defines "perpetuators" by privileging structures over actors (De Maio & Ansell, 2018), while structures themselves remain abstract (Herrick & Bell, 2022). Especially studies at the "micro" level, such as those on urban food environments, risk abstracting violence (Pavoni & Tulumello, 2024). Indeed, the few studies exploring food insecurity through a structural violence lens tend to offer generalized descriptions of its underlying causes. Whittle et al. (2015), for instance, zoomed in on lived experiences of hunger, anxieties to become hungry, unhealthy diets, and having insufficient disability benefits, while the "violent structures" of widespread urban regeneration and national welfare that the authors identify receive relatively little attention, let alone the mechanisms through which these structures (re)produce violence locally. In the following paragraphs, we thus introduce *infra*structural violence to move from abstract structures to (their) concrete infrastructural manifestations, to make sense of local stakeholder experiences of what drives food insecurity.

2.2. Infrastructural Violence and Exclusive Food Infrastructures

The 'infrastructural turn' in urban theory increased attention to infrastructures sustaining urban living, including food, mobility, water, energy, and digital infrastructures (Graham & Marvin, 2022). The concept of infrastructures has been widely applied to understand "things," the "relationships between things," as well as the processes of both (re)production and violence affected by "things and their relations" (Coutard & Florentin, 2024). In fact, the ability of infrastructures to affirm life is intractably linked to processes of subordination (Kallianos et al., 2023). Aligning with the notion of harmful infrastructures, Rodgers and O'Neill (2012) popularized the concept *infrastructural violence*: the violence of infrastructures that reflect and reinforce structural violence. Where structural violence ill-defines perpetrators, infrastructure is its "instrumentation medium, insofar as the material organization and form of a landscape not only reflect but also reinforce social orders" (Rodgers & O'Neill, 2012, p. 404). So, infrastructural violence does not only describe inevitable infrastructural harm, or how infrastructures materially embody violent structures, but also how infrastructures (actively) exacerbate violent structures (see also Coutard & Florentin, 2024).

While infrastructural violence has to our knowledge not been applied to food insecurity, studies have explored the harms of food and related (urban) infrastructures, without explicitly using the concept infrastructural violence. Urban food infrastructures include production, distribution, retail, and waste disposal (Marsden et al., 2018) that intersect with water, transport, and energy infrastructures, and are intertwined with social and political relationships and ideologies existing at multiple urban scales (Battersby et al., 2024). Food insecurity, then, arises out of the "[i]nadequacies in…access and supply" of these various natural, material and social infrastructures, by "undermin[ing] the ability to safely cook, clean, store, supply, manufacture and grow food, and dispose of or reuse food waste" (Battersby et al., 2024, p. 441).

Food(-related) infrastructures can thus be diverse, and exist at multiple scales. Yet, the few studies that explore such infrastructures, and how their mechanisms could impact food (in)security, are often situated at

the urban level, illustrating how an infrastructural lens can contribute to better understand the local (re)production of food insecurity. For instance, Deener (2017) studied how public-private urban development can create spatially exclusive food distribution infrastructure, and Power et al. (2022) how the uneven distribution of access to (in)formal welfare infrastructures can affect economic access to food. Studies on food banks further point to "infrastructural platforms" in particular cities that underpin food banks, such as funding, volunteers, logistics, and urban policies affecting food bank operations (Mitchell et al., 2025; Williams et al., 2024) and their "social infrastructures" such as networks, trust, and solidarity that link material food bank infrastructures with the people interacting with them (Connelly & Beckie, 2016; Kerstetter et al., 2023).

While studies have thus explored how infrastructures can (re)produce food insecurity, they have often done little to explicate those infrastructures as instrumental mediums of structural violence. Yet, doing so can "provide a productive means through which to talk about society's responsibility for…suffering and its obligation to work towards concrete changes to urban infrastructure for the sake of producing a more just tomorrow" (Rodgers & O'Neill, 2012, p. 407). Bruck and Garthwaite's (2021) come close. They trace how neoliberalism and austerity ("structures") permeate the operations, norms, and management of a food charity. Without explicitly referring to infrastructures, the authors describe what elsewhere have been called *infrastructural platforms*: "rules stemming from economic and bureaucratic pressures" that "can establish barriers to accessing essential material resources"; and *social infrastructures*, relationships that, because of those rules, are fraught with "tension, distrust and anxiety" that food charity visitors must negotiate "to ensure access to resources and garner emotional support" (Bruck & Garthwaite, 2021, p. 157).

We contend that infrastructural violence can be used to study how the place-based embodiments (infrastructures) of broader social arrangements (structures) (re)produce food insecurity. Infrastructural violence thus conceptually sensitizes our empirical analysis to focus on infrastructures, which might, based on the discussed literature, include "food chain infrastructures," "urban development infrastructures," and "welfare infrastructures," and their "infrastructural platforms" and "social infrastructures." We explore whether (or not) and if so how, as "material channels" of structural violence, they (re)produce food insecurity. This perspective supports ongoing calls to "re-localize" policy responses to food insecurity, offering an empirical basis for urban food policies (Sonnino, 2016). Despite their worldwide popularity and ambitions, urban food policies continue to overlook or fail to address food insecurity (Candel, 2014; Filippini et al., 2019; Moragues-Faus & Battersby, 2021; Smaal et al., 2020). Infrastructural violence complements existing explanations of food insecurity focused on its drivers or determinants (e.g., Fyles & Madramootoo, 2016; Warr, 2014) by illuminating the "material distribution of goods and bads that conditions people's access to good food…at the city scale and beyond"—a core gap in urban food policymaking (Moragues-Faus & Battersby, 2021, p. 5).

3. Methodology

3.1. Case Selection

This article was developed as part of the EU-Horizon Europe-funded FoodCLIC project (2022–2027) aiming to "ensure the availability and consumption of healthy, affordable, safe and sustainably produced food" across seven European city-regions, including Amsterdam, the context of our current article (Smolders et al.,

2023, p. 11). The project started with identifying areas in Amsterdam's metropolitan region "with significant proportions of food-deprived and vulnerable groups of people" (Smolders et al., 2023, p. 12). For this, a multi-criteria analysis was created compounding data on household income, self-reported control over life, and obesity, as respective indicators of income, health, and food security (following Simón-Rojo, 2021). Amsterdam Noord was one of the areas where people are most at risk of food insecurity and where the project team, including Jonathan Luger, successfully contacted city district representatives and policy makers early on. So, it became our study area (for an in-depth description of the case selection see Appendix E in Smolders et al., 2023).

3.2. Case Description

Noord housed 108,792 registered people in 2024, about 11.7% of Amsterdam's total population (Gemeente Amsterdam, n.d.). Home to historically working-class, marginalized neighbourhoods, Noord has been undergoing redevelopments. Some neighbourhoods undergo state-led gentrification (Van Gent et al., 2019), often the result of both national housing market liberalisation and, explains del Pulgar (2021), deliberate municipal efforts to turn them into culturally trendy, green urban oases, that together, if not physically, at least socially exclude long-term residents. While healthy, fresh food is overall easily accessible in Amsterdam, Noord's food environment provides significantly less healthy food than other districts in Amsterdam, and unhealthy foods dominate healthy food alternatives (Helbich et al., 2017). Since Covid-19, community food banks in Noord—to support those ineligible for or not willing to receive support from the one formal food aid organization (*Voedselbank*) in Noord (Buurtverbinders, 2023)—rapidly increased. Food banks often serve those who are severely food insecure, while many more might be food insecure (Garratt & Armstrong, 2024; Tarasuk et al., 2020)—this rise in food banks likely reflects increased food insecurity, while not necessarily saying anything about its scale. No clear data on food insecurity in Noord exists. A Dutch study did find that 19% of people in "strongly urbanized areas," compared to 14% nation-wide, lives with food insecurity (Veldkamp & van der Hoeve, 2024), and that 52% is caused by food unaffordability; significant, as the municipality appointed 16 out of 35 neighbourhoods in Noord as "development neighbourhoods" with a relatively high number of people living with low socio-economic positions compared to the rest of the city (Gemeente Amsterdam, 2021a). Furthermore, 14–16% of people in Noord live in so-called financially "vulnerable situations," higher than Amsterdam's 11% average (Gemeente Amsterdam, 2022), and 20.6% of households in Noord live below the municipal poverty line, 3.9% percentage points above Amsterdam's average (Gemeente Amsterdam, 2023).

3.3. Data Collection and Analysis

Data collection was organized as part of a community geography project in Noord initiated by FoodCLIC. The project team partnered with, and now funds, a network of community food banks over the course of 2023–2026 (Buurtverbinders, 2023). Community geography sees knowledge production as a process that should involve partnerships between researchers and various local stakeholders (Fischer et al., 2022; Shannon et al., 2021). FoodCLIC thus aligns with D. Smith and Thompson's (2022, p. 100) call for community geography, to "help avoid and remedy some of the recruitment and ethical challenges" that food insecurity research can encounter. The "community" of our research project consists of people involved with the community food bank network, including food bank volunteers and coordinators (all of which are residents of Noord, most of which experienced food insecurity), community workers, social workers, NGO directors,

benefits advisors, and local policymakers (some of which are residents of Noord, all of whom work in Noord). Data collection thus followed steps similar to the ones proposed by D. Smith and Thompson for qualitative place-based research on food insecurity, including both people with lived experiences of food insecurity and other stakeholders (see also Milbourne, 2024). We used snowball sampling to find interviewees (Noy, 2008), expanding the heterogenous group of participants to 28 to guarantee saturation (cf. Hennink & Kaiser, 2022). All interviews were conducted in Dutch, recorded on a portable recorder, stored on password-protected storage, and transcribed. Following the Code of Ethics of our faculty, no ethical review was needed for the research presented here (Vrije Universiteit Amsterdam, 2019). Informed consent forms outlining research objectives, data handling, and interviewee rights were presented to and signed by interviewees prior to interviews.

We first "focused on the food," following D. Smith and Thompson (2022), by developing a map of Noord showing five food environment dimensions (López Cifuentes & Sonnino, 2024): agri-food, retail, hospitality, community, and institutions (for the map see Smolders et al., 2023, p. 55). The map functioned as visual aid in the first interview round (June 2023, interviews 1–15, see Table 1) that "focused on the people" with experiences of food insecurity and those further up the "ladder of support." Core guiding interview questions were: (a) How is food insecurity experienced in Noord?; (b) What causes food insecurity in Noord?; and (c) What are possible solutions to food insecurity in Noord? It soon became clear that food insecurity for undocumented people is experienced differently from documented people, because the former do not receive the same (food) assistance as legal residents (Carney & Krause, 2020). Whereas most community food banks in Amsterdam predominantly serve undocumented people (Kriek & Mack, 2022), interviewees estimated that around four out of five recipients in Noord are documented. As such, Noord's case provides unique insights into food insecurity of documented people. The second interview round (September 2023—April 2024, interviews 15–30, see Table 1) focused on emerging themes relevant to documented residents only. Data further included fieldnotes from JL attending a community food bank network meeting (May 2023), a municipality event for community food banks (October 2023), and volunteering (distributing food parcels, cooking dinners) at three community food banks (June 2023). We substantiated empirical findings by drawing from municipal policy documents and statistics.

Based on our main question, data analysis was guided by two sub-questions: (a) How is food insecurity experienced by diverse stakeholders in Noord and (b) how do these stakeholders perceive the role of existing infrastructures in shaping food insecurity? We used Atlas.TI 25 following Braun and Clarke's (2006) thematic analysis that uses coding for theme development, while acknowledging analysis as an "inherently interpretive practice" (Braun et al., 2022, p. 2). First coding inductively, JL distilled (sub)themes on experiences of food insecurity and the infrastructures that (re)produce it, and built a codebook (see Supplementary File) used for a second round of deductive coding. This formed the basis for four result sections describing thematic pathways of how infrastructures cause or exacerbate food insecurity and/or other forms of harm in Noord. Marjoleine van der Meij contributed as "critical friend" (Erwee & Conway, 2006), ensuring conceptual, methodological and analytical clarity. We checked our preliminary findings at a FoodCLIC event in Noord (December 2023) and discussed our draft manuscript with the lead researcher of the community geography project (March 2025) and a neighbourhood representative who has, for years, been working closely with the community food banks, municipal officers, and social welfare organisations we interviewed (April 2025). Based on this round of verification, our findings were both confirmed and enriched.

Table 1. Overview of interviewees.

Interview number	Affiliation/experience of interviewees	Interviewee abbreviations	Interview date
1	Community food bank; experienced food insecurity	CFB1	June 2023
2	Community food bank; experienced food insecurity	CFB2	
3	Community food bank; experienced food insecurity	CFB3	
4	Community food bank; experienced food insecurity	CFB4	
5	Community food bank; experienced food insecurity	CFB5	
6	Community food bank	CFB6	
7	Community food bank	CFB7	
8	Local food producer	FP1	
9	Formal food bank	FFB1	
10	Formal food bank	FFB2	
11	Social welfare organisation	SW1	
12	Social welfare organisation	SW2	
13	Public health NGO	NGO1	
14	Municipality district department Noord	MN1	
15	Municipality of Amsterdam	MA1	
16	NGO facilitating a community food bank network Noord	NGO2	September 2023
17	Food aid distribution NGO	NGO3	
18	Community food bank	CFA8	October 2023
19	Social welfare organisation; community food bank; experienced food insecurity	SW3	
20	Social welfare organisation	SW4	
21	Social welfare organisation; formal food bank	SW5; FFB3	
22 (second interview with SW2)	Social welfare organisation	SW2	
23	Social welfare organisation	SW6	
24 (second interview with MN1)	Municipality district department Noord	MN1	
25	Municipality of Amsterdam	MA1	
26	Municipality of Amsterdam	MA2	November 2023
27	Municipality of Amsterdam	MA3	
28	Municipality of Amsterdam	MA4	January 2024
29	Public health NGO	NGO4	April 2024
30	Public health NGO	NGO5	

4. Results

Combined estimates from interviewees indicate that at the time of data collection (2023–2024) around 1,000 households received food assistance, around 1/16th of households in Noord (cf. Booi et al., 2023).

Interviewees pointed to different reasons underlying food insecurity, including loneliness (CFB5), family dynamics (SW3), or an inability to ask for welfare support (SW4), and gave various explanations of how food insecurity can be amplified, for instance through illiteracy (CFB5) and unhealthy food cultures (SW1). Still, most interviewees primarily attributed food insecurity to limited economic food access, and pointed to various social and material infrastructures (i.e., things and their relations; see Coutard & Florentin, 2024) specific to Noord affecting economic food access and/or leading to associated harms. The results are structured along four subsections that thematically discuss those infrastructures: food retail (4.1), urban development (4.2), welfare (4.3), and community food banks (4.4). There was generally little to no disagreement among interviewees regarding infrastructures underlying food insecurity; they rather disagreed on how to best address food insecurity. Core points are supported by significant numbers of variously affiliated interviewees. Some were able to provide more specific perspectives than others, together presenting "some kind of story" (Finlay, 2021) about food insecurity and its infrastructural causes in Noord.

4.1. Food Retail

Some social workers and community food bank volunteers mentioned that food retail in Noord is generally unhealthy. As one interviewee described:

> If I want to get some food in the neighbourhood…then I arrive at the bakery and there is…cheese sandwiches, pizza things…then at another bakery further down the road they have sandwiches with brie and meats…and in front of the supermarket there's a big stand with *kibbeling* [fried fish]. (SW1)

Supermarkets were referred to as the most important retail infrastructure in the district, and seen as dominated by processed, low-nutrition foods. One person living with food insecurity said "it is just made impossible to make a healthy choice" (CFB5). Indeed, 74.9% of Noord's food outlets are characterised as severely unhealthy or unhealthy, while their prevalence, with 3.1 outlets (supermarkets, take-away shops, restaurants, bakeries, coffeeshops, butchers, etc.) per 1,000 residents, is less than half of the city's 6.4 average (Van de Vlasakker, 2019).

Notably, over two-thirds of interviewees emphasized that price, more so than availability, excludes people from accessing healthy food, with unhealthy counterparts being more affordable. It is, for instance, "just so easy to get…a pack of noodles of 60 cents…they just don't cost you anything" (CFB5). One volunteer also explained how "it comes down to the price…to having only 10 euros a week, and then a bag of chips and 20 *frikandellen* [deep-fried minced-meat sausages] mean that my children can eat again for the next three days" (CFB2). An interviewee who had experienced food insecurity also said that "vegetables are just so expensive that if you only have 3 euros a day and you see that…green beans will cost you 1.90, then I think to myself…that is just so expensive" (CFB3). The relevance of economic access to food, let alone healthy food, increased on the back of the Covid-19 pandemic, housing crisis, energy crisis, and inflation. These drivers, according to the professionals working with community food bank volunteers (municipal employees, social workers, and NGO representatives), led to an increase food insecurity, notably "among working people" (MA1; SW4), because "after rent, healthcare, other medical bills…there is just not enough money left…to buy food, let alone healthy food" (NGO1). After Covid-19, said two NGO representatives (NGO1; NGO3), many people stayed food insecure and the "numbers did not bounce back" to pre-Covid-19 levels—and are seen as rising (SW4).

Importantly, how supermarkets nudge people towards unhealthy diets, notably through discount strategies and product placement, can especially influence people who are under financial pressure, mentioned volunteers and social workers (CBF1, 2, 5, 7; SW1, 4). Not only can a lack of spendable income itself lead to food insecurity, but also the stress associated with it can exacerbate unhealthy diets. People living in poverty are often "stuck in a cycle," explained SW4, "of thinking 'I have to survive' every day, wondering whether there will be food…which gives people so much depression, that after a while you can't think straight anymore." A community food bank volunteer (CFB5) with experience of food insecurity explained how that impacts eating behaviour: "No matter your…background…you get vulnerable and less resistant" if you are food insecure, "which costs a lot of energy and commitment which you don't have because you're feeling stressed." Such habits, explained another volunteer (CFB1), do little to alleviate stress in the long term, because "you just get more salt, more sweet, all types of E-numbers…you're forced to [eat like this] and it's easier and cheaper," and arguably addictive.

4.2. Urban Development

A municipal employee we spoke with, who used to work for a municipal planning department, recalled how his team would always call Noord "the sunny side of town" with "a lot of things happening" (MA1). Another interviewee said that planning has long been driven by "a large force of urban development power, by parties purely focused on building new [real estate] developments" (at the interviewee's request, this quote remains completely anonymous). The director of an NGO reflected similarly that "the municipality really…already for a long time…has lost their grip on the tempo…of these changes" driven by private entities (SW5). This section dives into how urban development has affected both affordable housing availability and food retail, that together not only exclude people from accessing food, but also lead to social exclusions.

Firstly, social workers and NGO representatives identified that urban development negatively impacts housing affordability, notably through gentrification. An NGO director questioned whether "existing residents really benefit from…new construction," because "there is a large amount of social housing that is all gone, that has been sold off" (NGO2). From 2012 until 2021, 3,437 social housing units were sold in Noord (Amsterdamse Federatie van Woningcorporaties, 2023)—notwithstanding newbuild social housing developments—leading to an overall decrease of Noord's social housing stock: from 68.3% in 2013 to 54.1% in 2023 (Gemeente Amsterdam, 2024a). This is partly yet significantly the result of deliberate "newbuild policies" that attract more affluent residents (Booi & Smits, 2017). Long-time residents residing in the remaining housing stock "complain that they cannot pay their rent anymore" (SW1). A social worker added that especially tenants of private sector housing are impacted by rent increases, including herself (SW3), reflecting the private sector rent increase of 16% between 2015–2021 alone (Booi et al., 2023). Linking this to food insecurity, another social worker added that rent increases especially affect "people…on welfare or a low income…because when they can't pay rent anymore [social services] get notified and a debt counsellor actually visits them," so they often rather pay rent than food (SW2). "Food is the last thing that people spend their money on" after their necessary bills, added NGO1.

Secondly, some interviewees emphasized that food retail has undergone changes due to municipality-led urban development. Two community food bank volunteers reflected how store rent increases made smaller shops and market stalls struggle. "When the rent increases, [small shops] at some point cannot pay them," said CFB2, and her colleague added: "At the market you used to have stands selling vegetables, cheese,

chickens, a bakery…now all gone because they had to increase their prices to pay for their places" (CFB1). Indeed, Noord's street market has struggled with price increases and limited market stall variety (Van der Groep, 2023). This is significant, as for many food insecure people in Noord, going to the market before closing time is an important strategy to acquire affordable or free vegetables. Simultaneously, between 2019–2024, hospitality in Noord increased by 17%, in many neighbourhoods vastly exceeding supermarkets (Sweco, 2025), following ongoing municipal policies to increase hospitality in Noord (Gemeente Amsterdam, 2022). These changes mark the demographic increase of young, highly educated, high-income earners in Noord residing in owner-occupied homes—which increased from 17% in 2005 to 31.5% in 2022 of residential dwellings—followed by municipal newbuild policies (Booi & Smits, 2017; Booi et al., 2023). Besides that, these demographic and paired commercial changes arguably affect food prices; social workers (SW1, 4–5) and a benefits councillor (MA2) observed how they these changes socially exclude lower-class, long-time residents. They "have the feeling that [they] do not have their own places anymore…there are now fewer than [before]," experienced MA2, while "hip coffee shops" emerge that serve "expats and people with children." SW5 notes that "hospitality or recreation is only for the middle class, it is not accessible, or sufficiently accessible, for socially lower classes, which is still the dominant group in Noord…leading to social exclusion…on the basis of financial situations."

4.3. Welfare

The Covid-19 pandemic and the ensuing (housing, energy, inflation) crises made people rely more on social services to receive welfare support. While Dutch welfare provision includes food aid (through the national food bank NGO *Voedselbank* with local branches), a combination of bureaucratic complexity, under-resourced social services, and institutional distrust seem to have created barriers to service provision and food assistance and can cause (additional) harm.

Social workers, volunteers, and an NGO representative (CBF1–2, 5; SW1–2, 4–6; NGO1) explained how the national benefits system, including unemployment benefits and childcare, healthcare, and rent allowances, has digital and administrative systems that are complex, especially for irregular, lower-income earners who are often least equipped to handle it. A debt counsellor, specialised in supporting people on benefits, explained: "We have a system that asks the most of those who have the least skills[,] are the most vulnerable [,and] are struggling to make ends meet….They need to be like accountants…to claim all their benefits deductions" (SW6). Another social worker added that, because of this complexity, "people are often not even aware of the…benefits they have a right to, so they remain stuck in a poverty cycle" (SW4). This mirrors how 34% of Amsterdam residents entitled to benefits do not receive them (Hoedemaker et al., 2022). Consequently, people struggle with delays, errors, or unclaimed entitlements, exacerbating their financial instability.

Crucially, local social services that can support people with applying for food or debt, income, or employment assistance are under-resourced according to social workers, municipal staff, and an NGO representative (SW1–4; MA2, 4; NGO1). As SW4 explained, "the problems are so huge, that we do what we can, but…the municipal district department just has a particular budget." Indeed, said MA4 about social services: "We cannot pay for everything." As a result, sufficient knowledge among social workers and municipal staff was said to be lacking. One social worker experienced that "social workers are not always skilled enough…to help people" (SW1). A staff member working on unemployment benefits verified that, among his colleagues, "not everyone knows which anti-poverty services the municipality offers" (MA2).

The temporality of community projects additionally harms social workers' ability to provide structural social care (SW4). While municipal budgets for employment and social services rose from 980.5 million to 1,208.8 million between 2018–2025 (Gemeente Amsterdam, 2018, 2024b), expenses stayed roughly the same when corrected for inflation (on average 3.95% in that period; cf. Centraal Bureau voor de Statistiek, 2025). Simultaneously, the *intensity* of poverty—gap between income and needs—steadily increased from 10% to 16% between 2019–2023, especially among "working poor" (from 16% to 23%; Centraal Bureau voor de Statistiek, 2024), who are often eligible for welfare support, yet are particularly difficult to reach by Amsterdam's social services (Sevil, 2024).

Additionally, the under-funding of social services, argued NGO1, makes it "very difficult to provide any sort of tailored social work." Social services necessarily uphold eligibility requirements for direct food or other forms of assistance that, reported interviewees, unnecessarily exclude people. A social worker recalled how a family was "denied food aid from *Voedselbank*…because they owned two cars [that] they first had to sell…but the husband was a taxi driver, and the mother had to drive their three autistic children to school every day, so [this] just doesn't fit in the system" (SW2). Another social worker criticized social services for similarly not providing tailored support: "Formal care services…just aim at reducing risks, so, for instance, making sure that [when someone is abused] she doesn't kill herself, but not providing any other sort of support," and "as long as people think 'How am I going to eat tonight?' " this risk-reduction approach does little (SW3).

Finally, half of our interviewees, across stakeholder groups, reported that food-insecure people can feel fear, distrust, and shame towards "public institutions," complicating their ability to seek support. As explained by a food bank volunteer, recipients often "do not want to have anything to do with public institutions" (CFB2), notably because of stories going around in Noord about social services taking children away when parents ask for food assistance (explicitly mentioned by multiple interviewees). While such stories are not always true, or are based on multi-problem situations people experienced in the past, they play into existing feelings of fear and distrust—likely arising out of oppressive historical relations between social services and residents in Noord (NGO2; SW5)—and are, in fact, crucial to understanding why people stay away from social services or *Voedselbank* (expert interview, March 2025). Additionally, people often distrust "the [national] system of benefits and allowances" because "everything needs to be proven, and if something goes wrong" people can be criminalized for "accidentally forg[etting] to provide documentation" (CFB5). Fear and distrust can be accompanied by shame: "If you are food insecure, you just notice with a lot of residents, there is a huge chunk of shame….They don't want to air out their dirty laundry" to social services, said a community worker (SW4). Another person said: "I'm just so ashamed to go to the food bank, and my colleagues work next to the food distribution and I just try to pretend like it's normal" (SW3).

Because *Voedselbank* registrations are carried out by social workers, some food-insecure people reportedly stay away from formal food assistance. As its district director explained: "There is a really large group that we [formal food bank] were not able to reach" after Covid-19 "that consciously decided not to go to us" because *Voedselbank* is part of the social services that people distrust, fear, and feel ashamed towards (SW5). Indeed, reflected a debt counsellor, social services "require people to open up and justify…why they need" formal food aid and "people don't want anyone looking into…their financial statements…which is completely understandable…because no matter how you see it, we [social services] are part of the system…that fucked up, for too long" (SW6).

4.4. Community Food Banks

Especially since Covid-19, people experiencing food insecurity are often those who fall in between the cracks of welfare provision; they might not earn enough to eat sufficient, nutritious food, but might also not be eligible to receive benefits or allowances. The now 11 community food banks emerged as critical support infrastructures in Noord (Buurtverbinders, 2023). "Their strength," said a social worker who regularly used to work with them, "is precisely their informality, that they are not all so regulated, having limited rules, and that they just hustle" to get by, while together still supporting twice as many people as *Voedselbank* (SW6). Often successfully so, it seems: "We had some people come to us," recounted one volunteer, "that said 'Because of you I cook again, and….I eat vegetables and fruits again' " (CFB5). Furthermore, community food banks provide more than only food, also assisting food parcel recipients with wider material (SW4; CFB1) and emotional (fieldnotes; SW3) needs, and creating reciprocal relations (CFB5; CFB7; MN1; MA2). Their approach to social care differs from the often distrusted national and local welfare infrastructures, making residents trust them more (SW4; SW5; SW6).

Yet, community food banks struggle to remain afloat. Firstly, they are dependent on volunteers who themselves often live in precarious health and/or financial situations. With all of them "something is wrong" (CFB1): "They need a significant amount of support and, as a figure of speech, also themselves go to food banks" (SW6). Secondly, they are often dependent on temporary locations and funding. They do receive support from social workers in managing these insecurities, but in the end, administrative burdens lie with volunteers themselves. Illustratively, the recent cut of municipal funding for one of the community food banks burdened volunteers to find additional funding (Soudagar, 2024). Thirdly, food supplies have been dwindling since the end of the pandemic with supermarkets increasing their efficiency to reduce waste: "Shop owners and suppliers are all run a bit tighter nowadays, everyone is trying to make sure they are not left with as much [food]" (FFB1).

Additionally, while community food banks attempt to stay independent, they also (in)voluntarily align with and adopt practices akin to those of welfare infrastructures (Section 4.3). An NGO representative working closely with community food banks (NGO2) explicitly criticised their "paternalistic" style of food provision, "putting everything in a bag and then saying 'Take it' [to recipients]…not organising it differently so that people are allowed to choose" (NGO2). While community food bank volunteers themselves emphasized their difference from social services (CFB1–4) and others did so emphasizing their *informality* (SW2, 4–6; MA1–2), their styles of operation can simultaneously lead to feelings of shame among recipients similar to those perpetuated by social services. One volunteer said: "My son…would never stand in line here [because] imagine his friends would see [him], he would find that horrible, the shame alone" (CFB2). Furthermore, community food banks variably started to do intake conversations, involving bank statement screenings and eligibility assessments, akin to those done by social services and *Voedselbank*. From 2024 onwards, the two largest "informal food initiatives [were] required to do intakes" by funders (SW2), while others already "used their own eligibility requirements and wanted to check people's bank statements" (SW6) to deal with food scarcity issues.

5. Discussion and Conclusion

This article studied food insecurity in Amsterdam Noord, a city district undergoing significant changes in recent years. We used community geography to explore stakeholder experiences of food insecurity and its underlying

causes in Noord, conceptualizing infrastructures as embodiments and reinforcements of structural violence (Rodgers & O'Neill, 2012). We found that the urban food environment of Noord stages an interplay of material and social infrastructures that (re)produce food insecurity and create other, associated harms. Notably, welfare infrastructures that ideally alleviate food insecurity can, in fact, not only exacerbate it but also cause additional harm. Below, we verify our findings and trace how the identified infrastructures are instrumental mediums of violent structures.

5.1. From Food Retail and Urban Development Infrastructures to Corporate and Neoliberal Structures

While food insecurity is multidimensional, unaffordability is a key driver in Noord (see also Frongillo et al., 2017; Loopstra, 2018; Ruel et al., 2010; M. D. Smith et al., 2017). Food retail infrastructures were reported as crucial to this, with healthier foods being more expensive and unhealthy options overwhelmingly available—indeed the case in Noord (Helbich et al., 2017; Van de Vlasakker, 2019). Supermarkets were seen as the most important retail infrastructure. 96% of Dutch residents—especially lower-income ones—use supermarkets as their main food source (Hoenink et al., 2023). This reflects a widespread corporatization of food systems, where "supermarkets…determin[e] what is produced, where, to what standards and price, and the outlets from which food is to be sold" (Burch et al., 2013, p. 216), consistent with the development of Dutch supermarkets (Grin, 2012), which prioritise profitability over healthy food affordability and accessibility (Middel et al., 2024). Supermarkets in Noord can thus be seen as local material channels of wider "supermarket structures" in the Netherlands and beyond. As 79% of supermarket offerings are unhealthy and marketed "overwhelmingly" and "irresistibly" (Raad voor Volksgezondheid & Samenleving, 2024), interviewees described food-insecure people struggling to make healthy choices on the back of poverty-related stress. Unhealthy food can become a coping mechanism for financial stress (see also Santiago et al., 2011), reinforcing cycles of food insecurity and poor health (Nagpaul et al., 2022).

Furthermore, interviewees reported that food retail changes (Sweco, 2025) tied to municipality-led gentrification (verified by Van Gent et al., 2019) have both made it harder for food-insecure people to access affordable, healthy food, and led to feelings of social displacement among lower-income residents (see also Anguelovski, 2015). In Deener's (2017, p. 1303) terms, this signals a "political economy of uneven territorial development" locally channelled through "infrastructural exclusions" (re)producing food insecurity. Following Hochstenbach and Ronald (2020), we argue these commercial changes reflect the national marketization of urban development: since the 1990s, national policies have promoted owner-occupied and unregulated private rentals, transformed social housing corporations into for-profit entities, and led to the sale of social housing stock—all followed through in Amsterdam (Amsterdamse Federatie van Woningcorporaties, 2023). These policies have disproportionately benefitted middle- and high-income residents, who have moved to Noord in large numbers (Booi et al., 2023). Besides retail shifts, this nationally-stimulated, municipality-led urban development was seen to impact spendable income, especially as real incomes stagnate and rent costs rise (cf. Frijters, 2024). As interviewees noted, lower-income residents often prioritise housing costs over healthy food (see also Dominick et al., 2018; Fafard St-Germain & Tarasuk, 2018).

5.2. From Welfare and Community Food Bank Infrastructures to Structural Drivers of Decentralization and Austerity

Core findings are those related to the harms—feelings of distrust, shame, fear, administrative burdens—associated with place-based welfare and community food bank infrastructures ideally set up to alleviate food insecurity. First, interviewees referred to the complexity and strict requirements of national welfare provision, which, following Simonse et al. (2023, pp. 265–266), "see[m] to increase rather than decrease financial insecurity for financially vulnerable households." While Noord-based social services can support people with administrative burdens, among others, social workers can struggle to provide tailored support, rather upholding standardized eligibility requirements that exclude people from service access—also the case for *Voedselbank*, of which the food aid registrations are carried out by social workers. This, we argue, reflects the structural decentralization of Dutch social work in 2015 and paired budget cuts that made service provision increasingly complex for social workers (Dibbets et al., 2021; Jansen et al., 2021). This risks playing into existing feelings of distrust among long-time, lower income residents in Noord towards social services, compounding oppressive historical relations (Gemeente Amsterdam, 2021b; Kremer, 2024), leading residents to stay away from food or other forms of assistance, and causing or exacerbating feelings of stigma.

In response, community food banks emerged, providing food and additional support, especially to people ineligible to receive welfare assistance. While they are generally trusted by residents (see also Luger & Kotsila, 2025), they face ongoing struggles due to what Mitchell et al. (2025) call "infrastructural platforms." In Noord, these include insecure funding, locations, volunteer capacity, and food supply. Community food banks thus take up the burden of welfare failures, while limited or reduced government support simultaneously hollows them out. This mirrors the effects of Dutch austerity politics of the last decades: "Cutbacks on healthcare expenditure and social welfare benefits…in the wake of the Eurozone public debt crisis" resulted in "informal caregivers, long-term care organisations and municipalities…experienc[ing] substantial difficulties to cope with the reforms" (Janssen et al., 2016, pp. 101–102). When, in response, community food banks tightened income requirements, as we found, they risked replicating and reinforcing the same stigmatization that welfare structures already impose on food-insecure people (May et al., 2019; Meyer et al., 2018). Taken together, the "chaotic welfare provisions" of place-based welfare and, to a lesser degree, community food bank infrastructures, we find, "signal…subordination and exclusion" and so, we argue with Hodgetts et al. (2014, p. 2050), infrastructurally embody the "structural violence [of] the brute nature of neoliberalism and institutional responses to it."

5.3. Urban Food Environments, Food Insecurity, Infrastructural Violence, and Community Geography: Reflections and Implications

Our results point to the complex nature of the experiences and causes of, and attempts to remedy, food insecurity in Noord's food environment. Importantly, despite attributing this infrastructural violence partially yet significantly to municipal policies in Amsterdam, these findings are likely not unique. They can be characteristic of similar urban areas with, at face value, a lot of available (albeit unhealthy) food, gentrification, and problematic social service delivery—for instance, gentrifying neighbourhoods in Portland, Oregon, where healthy food is plentiful for "gentrifyers" as opposed to working-class people and people of colour (Breyer & Voss-Andreae, 2013; Sullivan, 2014).

We contribute to adjacent literature in two ways. First, urban food environment research has long been critiqued for focusing more "on creating environments that promote healthy choices than on the political and economic decisions which shaped these environments to begin with" (Shannon, 2014, p. 256). While studies on *food deserts* (low food availability), *food swamps* (low healthy food availability), and *food mirages* (low healthy food affordability) have expanded the field (Yang et al., 2020), such perspectives still tend to overlook how, according to Page-Reeves et al. (2017, pp. 5–6), "the food environment is a socially constructed reality" produced by, notably, housing developments, local welfare systems, and food charity—all infrastructures that this article explored—which "further influence the food environment and the food security status of households in a neighbourhood."

Second, while food insecurity research has well established its global drivers, it generally lacks insight into place-based causes underpinning food insecurity (Odoms-Young et al., 2024; D. Smith & Thompson, 2022; cf. Vonthron et al., 2020). This article thus foregrounds place-based infrastructures underpinning food insecurity as embodiments *and* reinforcement of wider social arrangements, pointing to the responsibility of both "place-based actors" and society at large to change urban infrastructures for more just (food) futures (Rodgers & O'Neill, 2012). Infrastructural violence conceptually threads the line between localizing or individualizing causes of food insecurity (e.g., it being the result of particular residents failing to get a job) and anonymizing them (e.g., it is the result of inequitable social arrangements). Such insights are much needed to understand why and how urban food policymaking continuously fails to take into account food insecurity, and how to address this (cf. Moragues-Faus & Battersby, 2021).

Finally, a core finding infrastructural violence helped bring out is how local welfare and community food bank infrastructures contribute to food insecurity and associated harms by both embodying and reinforcing changes in wider welfare structures following decentralization and austerity. This brings out complexities much needed to achieve any sort of "infrastructural justice" in Noord, or what Williams (2022) calls *care-full food justice*: the ways in which care infrastructures (like welfare services and food banks) might alleviate rather than produce or exacerbate food and wider social injustices.

A number of criticisms can be raised. First, our interpretivist approach inevitably paints a partial picture. Infrastructures less prominent or not mentioned by interviewees that can affect food insecurity are, for instance, local food production (e.g., community gardens) and alternative forms of food retail (Marsden et al., 2018). Second, future studies could benefit from concretizing infrastructures methodologically, with methods like "go-alongs" (e.g., Santo-Tomás Muro et al., 2020) or "walkshops" (e.g., Rondel & Henneke, 2025), and including longitudinal and quantitative data (D. Smith & Thompson, 2022). This could improve understanding how "bodies, social and physical infrastructures and policies" interact in Noord, needed to "develop effective food policies" and wider food governance structures (Moragues-Faus & Carroll, 2018, p. 1349). Third, infrastructural violence downplays people's agency; stand-alone, it has little emancipatory potential, similar to structural violence (Jackson & Sadler, 2022). Much research has, for instance, already uncovered the care and justice contributions of community food banks across geographic settings (e.g., Cloke et al., 2016), or the "powerful" role of food policy actors (e.g., Mattioni et al., 2022). Over-focusing on (infra)structural violence, like this article does, risks obscuring the everyday forms of resistance through which residents, volunteers, and professionals navigate and challenge food insecurity—the first author of this article explores this in another manuscript on the same case study (Luger & Kotsila, 2025).

5.4. Concluding Recommendations

The urban food environment of Amsterdam Noord stages various infrastructures that actively produce food insecurity and associated harms, including food retail, municipal planning, social services, community food banks, voluntary networks, funding schemes, bureaucracies, and trust. In our discussion, we argued how these infrastructures variably embody and, at times, reinforce violent structures: housing marketization, supermarket corporatization, historical relations between residents and the state, welfare bureaucratisation, social service decentralization, and austerity politics. Key findings are that urban development, in various ways, impacts experiences of food insecurity, and that welfare and community food bank infrastructures can, in fact, exclude people from accessing healthy and affordable food and/or contribute to significant administrative burdens and feelings of fear and shame. Taken together, this article points to the complex, layered, and active production of food insecurity in an urban food environment.

Our infrastructural violence lens, supplementing structural violence, illuminates that the ability to address the various harms associated with food insecurity lies, at least partially, locally, with volunteers, social workers, and municipal staff, because they are both shaped by but also shape "their" respective community food bank, social welfare, and municipality infrastructures. Practically, we recommend that policymakers acknowledge food insecurity as actively (re)produced both globally and locally, and as often intersecting with additional forms of harm; they should make efforts to uncover how exactly in their own contexts. Additionally, we call on them to scrutinise local welfare and food charity organisations, as our findings point out they can—often unintentionally, yet disproportionally—harm those already living with food insecurity.

Academically, future studies should, firstly, explore how community food banks can contribute to turning their infrastructural violence into care-full food justice (Williams, 2022) by collaborating with state institutions (Power et al., 2022). Secondly, studies should focus on municipal staff who are increasingly responsible for projects on "just urban food systems" (cf. Sonnino, 2023), as is the case in the FoodCLIC project, and who are thus relatively powerful state actors in the production of ideally healthier and more accessible urban food environments (Luger et al., 2025). Thirdly, despite decades of research, urban food insecurity is not improving, even in food policy-pioneering cities (Moragues-Faus & Battersby, 2021). An ongoing engagement is thus needed with the knowledge production that informs urban food governance. This is both a question of critically investigating "who funds and benefits from urban food governance processes" (Moragues-Faus & Battersby, 2021, p. 5) and choosing more radical research approaches (e.g., community geography, transdisciplinary research, radical reflexivity; T. S. Jones & Loeber, 2024; O'Neill & Luger, 2024).

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The authors declare no conflict of interests.

Data Availability

The data supporting the findings of this study cannot be made publicly available to ensure participant anonymity.

LLMs Disclosure

Not applicable.

Supplementary Material

Supplementary material for this article is available online in the format provided by the authors (unedited).

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ARTICLE

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Building Community Food Resilience: Tracing Socio-Technical Infrastructures of *Ollas Comunes* in Chile's Food Deserts

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Abstract

Food deserts highlight the uneven distribution of food infrastructure that disproportionately impacts marginalised communities, exacerbating their food insecurity. Residents in these areas face daily food access challenges and, in the global South context, rely on informal markets and community-based solidarity networks. This article seeks to draw lessons for resilience from community-led initiatives that contribute to food security in urban food deserts. It focuses more specifically on *ollas comunes* (community soup kitchens) in Santiago, Chile, understanding the role these played before, during and after the Covid-19 pandemic. Using institutional ethnography, the article examines how *ollas comunes* address immediate community food insecurity, and sustain themselves over time through complex, dynamic socio-material assemblages. The research considers how relationships are structured between participants, and how space, material objects, norms, and routines, shape and reconfigure interactions and outcomes. The findings reveal critical factors that bolster community food resilience: the involvement of diverse actors, their adaptive capacity, and their ability to reconfigure social and material networks. Additionally, the research highlights the uneven barriers to resilience, faced by formal and informal groups. This study contributes to rethinking urban food environments from the ground up, emphasising how bottom-up initiatives respond to systemic gaps within food deserts. It offers critical insights for policy and planning to build food resilience, highlighting the need to support and recognise the social infrastructures that sustain communities in times of crisis and beyond.

Keywords

community kitchens; community resilience; food deserts; *ollas comunes*; social infrastructure

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1. Introduction

The urgent need for food system transformation is increasingly recognised in the face of climate change and multiple interconnected crises including biodiversity loss, economic inequality, and geopolitical conflicts (Béné et al., 2019; Leeuwis et al., 2021). Recent studies highlight that six planetary boundaries have been exceeded primarily due to human activity (Richardson et al., 2023). Food systems are central to this crisis, contributing approximately 34% of total greenhouse gas emissions (Crippa et al., 2021), while being highly vulnerable to climate-induced disruptions such as more severe droughts, floods, and heatwaves. These disruptions pose severe risks to agricultural productivity and food security, especially in urban areas that rely on complex and often fragile supply chains (Wiebe et al., 2019).

Access to food in cities is not homogeneous. Urban food deserts, understood as areas where access to affordable, nutritious food is limited due to spatial, economic and infrastructural barriers, have become a relevant lens for understanding the uneven geographies of food insecurity (Widener & Shannon, 2014). While initially developed in the context of cities in the global North (Shannon, 2014; Walker et al., 2010), the concept has gained political traction in the global South, where rapid urbanisation, socio-spatial segregation, and fragmented food systems exacerbate vulnerabilities (Battersby, 2012; Battersby & Watson, 2018). In these contexts, food deserts are not simply zones of market failure defined by the absence of supermarkets or formal food outlets. Instead, they represent sites where systemic inequalities, rooted in planning decisions and mobility constraints, materialise in everyday struggles for nourishment (Battersby, 2019; Nicoletti et al., 2023). Thus, food scarcity is a socially constructed phenomenon; while food might be produced in sufficient quantities overall, access remains highly unequal due to systemic barriers (Sen, 1981).

In global South contexts, food deserts intersect with broader patterns of urban marginalisation (Battersby, 2019). Here, residents in low-income and peripheral neighbourhoods often rely on informal markets and community-based solidarity networks to meet their food needs (Duque Franco et al., 2020; Osuteye et al., 2020). Although resilience in food deserts is often embedded in everyday community practices, it frequently remains unrecognised by policy and planning frameworks (Pelling & Manuel-Navarrete, 2011)—only gaining visibility when major crises occur. Grassroots responses, for instance, became particularly visible during the Covid-19 pandemic. The disruption to global and regional food supply chains led to widespread loss of income and rising food prices, disproportionately affecting low-income populations (Clapp & Moseley, 2020). As many governments failed to meet the needs of their citizens, community food initiatives (CFIs) such as community soup kitchens (re)emerged as vital infrastructures of survival and care (Bezerra et al., 2025; Desmaison et al., 2022; Leetoy & Gravante, 2021; Osuteye et al., 2020).

This article contributes to research on urban food environments and resilience by examining how community responses adapt to crises and sustain food access and consumption in urban food deserts. Grounded in the first author's PhD research, it focuses on the case of Santiago, Chile, where institutional neglect and entrenched structural inequalities have contributed to the emergence of food deserts in specific urban areas. In this context, *ollas comunes* (community soup kitchens) have become essential grassroots strategies for addressing local food insecurity since the late 1940s (Gallardo, 1985). The central research question guiding this article is: *How do* ollas comunes *operate in Santiago's urban food deserts, and how do their actors and practices evolve in response to shocks such as the Covid-19 pandemic, to ensure food resilience?*

Chile presents a paradoxical scenario. While it boasts one of the highest per capita incomes in Latin America and has made significant progress in reducing income poverty—from 38.6% in 1990 to 6.5% in 2022 (Ministerio de Desarrollo Social, 2022; OECD, 2021)—it remains the most unequal country in the region, with the wealthiest 10% controlling nearly 60% of national income (De Rosa et al., 2020). This contradiction is also reflected in the country's food and nutrition landscape. Although Chile reports one of the lowest rates of food insecurity in Latin America, it faces alarming levels of malnutrition: 74% of the population is overweight, 38.9% is classified as obese, and nearly 40% cannot afford a healthy diet (FAO et al., 2025). These figures highlight the complex relationship between economic development, social inequality, and nutritional outcomes.

Urban food insecurity in Chile is further shaped by spatial and infrastructural disparities. Food deserts are typically located in low-income residential areas that lack reasonable walking access to the country's two main food distribution systems (Zazo & Orellana-McBride, 2023). On one hand, supermarkets—driven by market logic—offer a wide variety of food products but are unevenly distributed across the urban landscape. On the other hand, *ferias libres* (municipally regulated street markets) provide weekly access to fresh produce and are more common in low- and middle-income neighbourhoods. Moreover, food deserts in Santiago are positively correlated with higher rates of cardiovascular disease among elderly residents, particularly in low-income areas (Landaeta-Díaz et al., 2024).

In this context, *ollas comunes* are crucial social infrastructures (Valenzuela-Levi et al., 2024). They play a critical role in the collective preparation and distribution of meals, supporting low-income neighbourhoods where urban food infrastructure is already fragile—areas that exemplify the concept of food deserts. Its origins are often located in a shared historical memory that can be traced back to the organising efforts of women in low-income, peripheral neighbourhoods in Chile during the housing movement in the 1960s, and more visibly, during the economic and political crises of the Pinochet dictatorship in the 1980s (Gallardo, 1985; Hiner et al., 2022). These historical trajectories are activated in the present, shaping how women—many of whom are already primary caregivers in their households—and communities mobilise food, space, time, and care under contemporary conditions of precarity. As Jirón et al. (2022) argue, these practices reflect a gendered reconfiguration of care work, where domestic labour is extended into the public sphere in response to crisis.

Although the number of *ollas comunes* has fluctuated over time, they resurfaced during the mass social uprising of October 2019 (Fuentes et al., 2022), serving both as a means of providing meals to protesters and as a powerful symbol of resistance. Moreover, during the Covid-19 pandemic, their presence became even more pronounced as unemployment surged and poverty intensified. Many grassroots food initiatives proliferated across Santiago and other urban centres, stepping in to fill critical gaps in food provisioning left by an overwhelmed and often absent state (Hiner et al., 2022; Valenzuela-Levi et al., 2024). Due to their deep historical and cultural embeddedness that enables rapid mobilisation in times of crisis, *ollas comunes* in Santiago offer valuable insights into food resilience, revealing their adaptive capacity and transformative potential in navigating systemic shocks.

To examine *ollas comunes*, we adopt a relational and material approach. Drawing on institutional ethnography (IE; Smith & Griffith, 2022), and focusing on their practices before, during, and after the Covid-19 pandemic, we uncover the coordination between formal and informal circuits. Using this approach we also aim to bring into view the diverse human and non-human actors that constitute *ollas comunes*—such as large pots, food

banks, digital platforms, municipal permits, and volunteers—that collectively contribute to building resilience. Rather than framing resilience as a neutral or purely technical capacity, we understand it as a contested and relational process shaped by gendered labour, material constraints, and institutional power (Béné & Devereux, 2023; Blake, 2019; Kaika, 2017).

The article is organised into four main sections. First, we review the existing literature on food systems resilience, arguing for the need to move beyond a narrow focus on physical or technical infrastructure and large-scale investments. Instead, we emphasise the importance of local scales and the recognition of people as infrastructure—particularly through community-based food initiatives. These initiatives, often overlooked in mainstream policy and planning, offer critical insights as they navigate everyday scarcity and systemic challenges. We examine how such initiatives have been addressed in existing scholarship and explore the added value of a social and material lens in understanding their role in resilience thinking. Second, we outline the research methodology employed in the research. Third, we present an analysis of the social and material arrangements underpinning selected *ollas comunes* in Santiago, focusing on their practices across different stages: food acquisition, cooking, distributing, and eating. Finally, we summarise the key findings and offer recommendations for policy, planning, and future research, with particular attention to the role of community agency in fostering resilient urban food systems.

2. Resilience in Food Deserts: CFIs as Socio-Technical Infrastructures

Food deserts offer critical insights into the nature of resilience. In these environments, scarcity is not an occasional disruption but a persistent, structural condition. Individuals and communities must continuously navigate limited access to affordable, nutritious food, often relying on informal networks, adaptive strategies, and creative resource management to meet their daily needs (Battersby, 2012; Battersby & Watson, 2018). This ongoing negotiation with scarcity reframes resilience—not as a reactive response to rare shocks, but as a lived, everyday practice embedded in social and material life (Battersby, 2019). When additional crises occur—such as the Covid-19 pandemic—these already strained realities are pushed even further, revealing both the fragility and the ingenuity of local coping mechanisms (Duque Franco et al., 2020). Examining how people in food deserts meet their needs during such compounded crises, including economic downturns or natural disasters, exposes the embedded capacities for adaptation, solidarity, and transformation that are central to resilient systems (Pelling & Manuel-Navarrete, 2011).

These real-world practices of resilience resonate with and enrich the theoretical foundations of the concept as introduced by Holling (1973) in ecological sciences, where resilience is defined as the capacity of a system to absorb disturbances, adapt, and reorganise while retaining its core functions and structure. The lived experiences in food deserts illustrate this dynamic vividly, showing how communities reorganise and adapt under chronic stress. In recent years, this ecological framing has been increasingly applied to food systems research, where scholars emphasise resilience at multiple levels—from individuals and households to entire communities. Within this context, resilience is understood as the ability to withstand and recover from shocks and stressors without compromising long-term wellbeing and food security (Béné & Devereux, 2023; Tendall et al., 2015; Zurek et al., 2022). The everyday realities of food deserts, therefore, offer a critical empirical context for exploring how resilience is enacted in practice, highlighting both the vulnerabilities and the strengths that shape food system dynamics under conditions of chronic scarcity.

Debates in this field have highlighted the complexity of building resilient food systems, particularly in navigating trade-offs among competing outcomes (Ericksen, 2008), managing tensions between local and regional scales (Allen, 2010; Born & Purcell, 2006; Enthoven & Van den Broeck, 2021), and addressing entrenched power asymmetries in food governance (Arthur et al., 2022). However, resilience is often framed in technocratic or managerial terms—as an imperative to adapt—rather than as a call to transform the socio-political structures that produce vulnerability in the first place. As Kaika (2017) notes, such framings frequently shift responsibility onto communities, expecting them to "bounce back" from crises without addressing the systemic inequalities that underlie their precarity. Pelling and Manuel-Navarrete (2011) similarly caution that resilience discourses often unfold within governance arrangements that prioritise stability over adaptability, thereby limiting long-term sustainability. This reflects what Humbert and Joseph (2019) describe as the "politics of resilience," where adaptation is promoted within neoliberal frameworks that normalise crisis, responsibilise communities, and ultimately reproduce the status quo.

Yet, despite these critiques, community resilience remains a vital focus in the global South, where structural inequalities, climate vulnerability, and limited state capacity often leave communities with few alternatives. The adaptive capacity of communities in the global South is not merely shaped by immediate environmental or economic stressors but is deeply constrained by historical legacies of colonialism, extractive development, and systemic marginalisation (Battersby, 2012; Wittman et al., 2010). These structural conditions have entrenched inequalities and weakened institutional support, leaving many communities with limited access to resources, decision-making power, and formal safety nets. In such settings, resilience cannot be reduced to technical interventions or isolated community efforts. Instead, it must be politically informed, culturally grounded, and socially inclusive. As Ensor et al. (2018) argue, resilience-building must engage with the broader institutional and political landscapes that shape both vulnerability and the capacity to adapt. This means recognising that CFIs are not merely coping mechanisms, but also potential sites of resistance, innovation, and transformation within unjust systems.

CFIs emerge as both practical responses to food insecurity and as strategic interventions that challenge dominant food regimes. CFIs—including for example community gardens, community kitchens, and solidarity purchasing groups—offer a grounded, justice-oriented alternative to top-down resilience frameworks (Blake, 2019; Tilzey, 2017). Agroecological models promoted within CFIs enhance ecological resilience by fostering biodiversity, supporting local knowledge systems, and reducing dependence on industrial food regimes (King, 2008). Community kitchens, as CFIs, represent not only alternative modes of collective cooking but also potential sites for agroecological urbanism (Gennari & Tornaghi, 2020). Strong local food networks contribute to social resilience by building reciprocal relationships between producers and consumers, expanding access to nutritious food, and fostering social cohesion (McDaniel et al., 2021). CFIs often operate on shared values of sustainability, equity, and collective responsibility, translating into tangible benefits such as enhanced food security, economic stability, and community empowerment (Allen, 2010; Campbell et al., 2022). For instance, Guidi and Andretta's (2015) study of Italian Solidarity Purchase Groups illustrates how resilience can function as a form of resistance, reconfiguring social relations through practices of mutual aid and collective care.

However, the transformative potential of CFIs must be understood alongside the persistent challenges they face. Limited resources, internal governance tensions, and divergent priorities can impede their scalability and long-term viability (Ghose & Pettygrove, 2014). Moreover, CFIs may inadvertently reproduce the very

structural inequalities they aim to redress, including those rooted in colonialism, capitalism, and systemic racism (Guthman, 2008; Slocum, 2007). As Blake (2019) argues, neoliberal policies often exhort communities to self-organise while simultaneously undermining their capacity to do so—eroding public support systems, weakening local ties, and limiting access to essential resources. Dowler and Caraher (2003) describe this contradiction as "new philanthropy," whereby structural neglect is reframed as community empowerment. In such contexts, CFIs frequently emerge as informal responses to state withdrawal, with the burden of care disproportionately carried by women and other marginalised groups.

While critiques of resilience discourse are valid and necessary, they should not overshadow the pragmatic and transformative potential of community-based food initiatives in the global South. When supported and scaled appropriately, these efforts can serve not only as buffers against shocks but also as foundations for more just and sustainable food systems (Allen, 2010). Realising this potential, however, requires a shift in how resilience is conceptualised and operationalised—one that moves beyond a narrow focus on physical infrastructure and embraces the importance of social infrastructure as a critical foundation for community wellbeing. Yet, despite growing recognition of the value of social infrastructure, resilience policy and planning—particularly in urban contexts—continue to prioritise physical infrastructure (e.g., transportation, water, energy, telecommunications) as the primary means of ensuring functionality and stability (Graham & Marvin, 2002). This technocratic bias assumes that urban areas, by virtue of their infrastructure density, can inherently meet residents' needs. As a result, policy often favours large-scale, capital-intensive investments (Nijman & Wei, 2020), sidelining the everyday, community-driven practices that sustain urban life. Scholars working in and on the global South have increasingly challenged this view, calling for a more situated and relational understanding of infrastructure (Kaika, 2015; McFarlane, 2009). In these contexts, infrastructure is often fragmented, improvised, and co-produced—emerging through everyday practices that blur the boundaries between formal and informal, material and social (Battersby, 2012; Battersby & Watson, 2018; McFarlane & Silver, 2017).

Recognising these dynamics is essential for reimagining resilience not as a return to normalcy, but as a pathway toward more inclusive and context-sensitive urban futures. This shift has prompted what scholars describe as a "relational turn" in infrastructure studies, which foregrounds how infrastructures are not merely physical systems but are deeply shaped by institutional logics, power relations, and embodied labour (Renner et al., 2024). Rather than viewing infrastructure as static or purely technical, McFarlane (2021) advocates understanding it as a mode of urban life, constituted through the interactions of people, materials, and institutions. From this perspective, social infrastructure is not secondary to physical infrastructure but is central to how cities function and adapt. It operates through dynamic processes of coordination, consolidation, and speculation (McFarlane & Silver, 2017), and is often most visible in contexts where formal systems are absent or unreliable. Simone's (2004) concept of "people as infrastructure" captures this vividly, showing how social relations and collective labour substitute for state services and challenge dominant planning imaginaries. This understanding has been further elaborated through work on infrastructures of social care (Hall, 2020) and infrastructures for social life (Klinenberg, 2018; Latham & Layton, 2019), which emphasise the everyday interactions and institutions that sustain community wellbeing. Feminist scholars have also drawn attention to the gendered dimensions of infrastructure, highlighting how the often-invisible labour of care—disproportionately undertaken by women—underpins the functioning of everyday systems, yet remains largely unacknowledged in mainstream planning frameworks (Hall, 2020; Hayden, 1980; Kern, 2021).

This conceptual broadening of infrastructure invites a reconsideration of food systems through a socio-material lens as socio-technical arrangements. Building on Callon's (2004) formulation, socio-technical arrangements refer to the interdependent configurations of social actors, institutions, material and technical elements that shape how systems function and evolve. These arrangements are co-produced through interactions between human and non-human entities—experts, users, tools, technologies, and regulatory frameworks—and are embedded in power relations that determine access, labour, and legitimacy (Monstadt & Schmidt, 2019). Food systems, in particular, are complex socio-technical systems encompassing activities from cultivation to consumption, embedded in socio-ecological structures and shaped by diverse actors (Tansey & Worsley, 1995). While physical infrastructure (e.g., transport and storage) is essential to food flow, social infrastructures—such as *ollas comunes*—are equally vital in ensuring food access and reinforcing local food security.

3. Methodology: Exposing the Actors and Coordination of *Ollas Comunes*

To explore how *ollas comunes* operate and adapt, this article adopts an IE approach. Developed by feminist sociologist Dorothy Smith, IE is an interdisciplinary mode of inquiry that takes a relational and socio-material perspective to understand an institution (Smith & Griffith, 2022). "Institution" in IE is not another word for organisation or establishment, nor is it an objective entity that intervenes in people's lives. It refers to the complexes of activities organised around a distinctive function. This aligns with Callon's (2004) notion of socio-technical arrangements, in which IE not only brings interactions between people to the fore, but also encourages an understanding of materially mediated practices. IE enables one to explore and talk about the ways in which material entities are able to order people's activities and thus highlight the transactions that take place (Smith & Griffith, 2022).

More than a research methodology, IE offers a distinctive ontological and epistemological framework for understanding the social world, emphasising how discourse and things coordinate people's actions in different settings (Smith & Turner, 2018). A core principle of IE is a commitment to "taking sides," which means adopting a situated standpoint rooted in the lived experiences of marginalised groups in order to examine how institutions work in practice (Smith & Griffith, 2022).

This approach proves valuable for tracing how *ollas comunes* in Chile respond to community food insecurity as an *institution*, and how their socio-technical assemblages shift to sustain that role. It attends to the structure of relationships among participants, as well as the influence of spatial arrangements, material objects, norms, and routines—both within and beyond the *olla común*—in shaping interactions and outcomes.

IE's practice of mapping enables researchers to trace coordination across time and space. While Smith foregrounds "texts" as key mediators, this study positions food itself as a central organising element. Following its journey, from procurement and collective cooking to distribution and consumption, reveals the interconnected actors, practices, and places that sustain *ollas comunes*. This lens illuminates food's capacity to mediate activity and anchor social relations within broader institutional landscapes.

The existing data evaluation involved submitting a public data request under the Transparency Law to all 52 municipalities within the Santiago Metropolitan Area, seeking information on *ollas comunes* that operated between 2020 and 2024. The request asked for details such as the names of the organisations, their

addresses, and other relevant information. Of the 52 municipalities contacted, 45 responded. Among these, 32 provided data on active *ollas comunes*, while 13 either reported no available information or stated that no such initiatives were recognised within their jurisdictions. Analysis of the official data revealed that approximately 1,097 *ollas comunes* were operational at the height of the Covid-19 pandemic in 2020. This number declined over subsequent years, with 428 active in 2021, 157 in 2022, 142 in 2023, and 104 still functioning in 2024.

From this dataset, 16 *ollas comunes* were selected for further study, focusing on those that remained active in the post-pandemic period and were located in low-income, peripheral neighbourhoods of Santiago, Chile (see Figure 1). The research included 31 semi-structured interviews with participants from these 16 *ollas comunes*. Participants were recruited through purposive snowball sampling, using publicly available information from social media platforms. Initial contact was made via WhatsApp, followed by the distribution of information sheets and consent forms through email. Most interviews were conducted face-to-face and focused on participants' everyday practices within the *ollas comunes*, capturing their lived experiences as they sourced ingredients, prepared meals, and distributed food to community members. Additionally, 14 interviews were conducted with academics, local government officials, NGO representatives, and policymakers to gain broader perspectives on the role of *ollas comunes* and to explore the interactions between the state, private sector, civil society, and informal food systems.

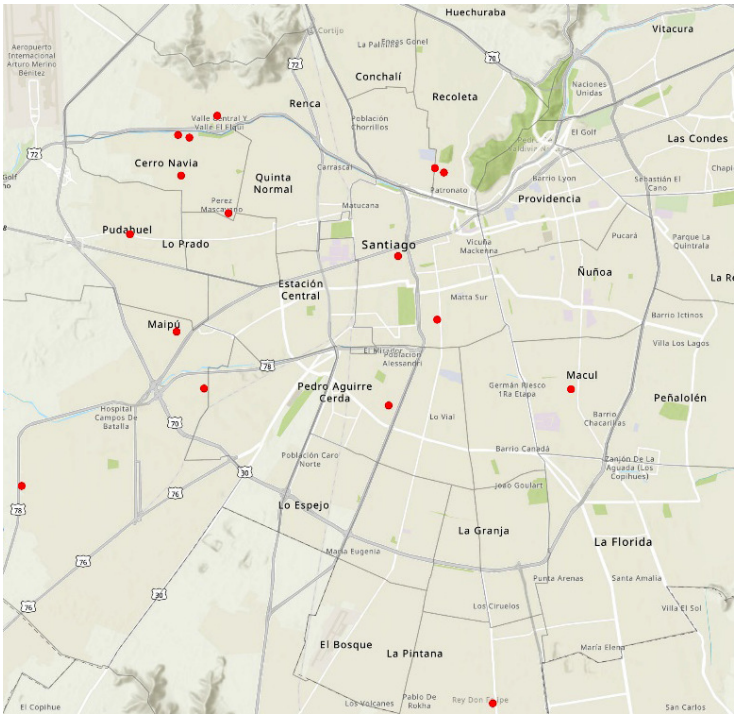

Figure 1. Map of the *ollas comunes* interviewed in Santiago Metropolitan area. Source: Authors' own using ArcGIS.

Additionally, the research incorporated two focus group discussions to deepen collective reflection and co-produce knowledge. The first session, conducted at the outset of fieldwork, brought together 15 participants from three *ollas comunes* to identify shared challenges and collaboratively define the research scope. The second focus group, held at the conclusion of the fieldwork period, involved

17 participants from eight *ollas comunes* and served to validate preliminary findings and facilitate collective reflection on the research outcomes.

Participant and ethnographic observation were central to the research design, complemented by shadowing through active volunteering in the daily operations of the *ollas comunes*. This immersive approach enabled the researcher to observe mundane procedures, routines, and practices, offering insights into the micro-processes of assemblage formation that sustain food provisioning in contexts of scarcity. The analysis focused on understanding how coordination unfolds, the evolving roles of different actors, and how these dynamics influence outcomes over time. In essence, the research sought to capture the everyday mechanisms through which *ollas comunes* operate and adapt, revealing the relational and material infrastructures that underpin informal food systems. All interviews, focus group discussions, and ethnographic field notes were transcribed and systematically coded using NVivo software to support thematic analysis and ensure methodological rigour.

4. Tracing the Socio-Technical Arrangements of *Ollas Comunes*

4.1. Procuring, Collecting, and Transporting Food Resources

Procuring food is the first key step in the coordination of activities for an *olla común*. Building on critiques that food deserts overlook socio-spatial inequalities in the global South (Battersby, 2012, 2019; Battersby & Watson, 2018), our findings demonstrate how *ollas comunes* overcome these through formal and informal networks. Participants described a multifaceted system in which food is primarily obtained through donations rather than direct purchases. This includes contributions from food banks, *ferias libres* (farmers, street markets), micro-food banks, local shops, and municipal agencies. The connections between *ollas comunes* with *ferias libres* and local shops are often informal, based on previous relationships of trust and solidarity within neighbourhoods. In the case of the *ferias libres*, which operate weekly in several streets in low-income areas, their role was particularly crucial. Many of the organisers of *ollas comunes* were the same neighbours who had previously shopped at these street markets, allowing them to coordinate directly with vendors to collect damaged or unsold food. This was confirmed by one of the volunteers: "We collected unsold fruit and vegetables by hand every Thursday because the *ferias libres* vendors trusted us to use them for a good purpose, and we have known each other for so long."

Following the pandemic, some of these interactions evolved into more organised yet still informal practices, with vendors beginning to pre-sort surplus food for donation, thus streamlining the collection process for *ollas comunes*. These exchanges can exemplify a relational infrastructure (McFarlane, 2009; Simone, 2004), in which social ties and material practices co-produce food flows.

By contrast, food banks and micro-food banks tend to operate under more formalised protocols (e.g., having legal status, balance sheet and board). These arrangements are often based on food donations from the private sector (e.g., supermarket surpluses), which require a degree of accountability and traceability in order to monitor the flow of resources and assess their impact. In particular, before the pandemic, food banks tended to channel donations to various grassroots organisations. During the pandemic, however, this support shifted mainly to *ollas comunes*, a trend that continued in the post-pandemic period. Donations are also channelised through micro-food banks or NGOs such as CODEMA (Food Market Observatory

Corporation), which collect surplus from vendors at *ferias libres*. These practices can redistribute surplus in ways that reduce waste and promote access to food. These arrangements reflect a negotiation between informal grassroots practices and the institutional protocols that govern surplus management, reinforcing hierarchies within the food system and competing for scarce resources (Dowler & Caraher, 2003; Ghose & Pettygrove, 2014). The need for accountability and traceability in these formal circuits also contrasts with the flexibility and immediacy of informal networks (Pelling & Manuel-Navarrete, 2011). These institutions often dictate what food is available, how, and to whom, reflecting underlying power relations within food systems (Arthur et al., 2022) and determining which actors and resources gain legitimacy. Most of these actors provide fresh produce such as fruits and vegetables, while proteins, which are considered more expensive and less frequently donated, often require additional purchases. This reflects how institutional discourses and practices around food security can shape the nutritional profiles of what is made available to grassroots organisations at local scale (Allen, 2010; Born & Purcell, 2006; Enthoven & Van den Broeck, 2021).

Digital platforms such as WhatsApp or Facebook emerged as critical communicative infrastructures during the pandemic, enabling real-time coordination of donations, volunteer mobilisation, and inter-*olla* collaboration. These technologies mediate the mobilisation of material and economic support that bypassed institutional delays, reinforcing community autonomy and adaptability (Blake, 2019). As such, these tools represent informal, yet highly effective, modes of organising in contrast to more rigid institutional systems. These platforms also exemplify how socio-technical arrangements extend beyond physical assets to include relational and technological components that sustain resilience. As one volunteer explained: "We created a WhatsApp group for *ollas comunes* across the city. The purpose was to help each other with surplus food donations."

Some *ollas comunes* also engage in community gardens as a complementary source of food (Figure 2). While these gardens make a symbolic and limited contribution to the everyday cooking needs, they reflect grassroots efforts toward territorial autonomy and food resilience (Gennari & Tornaghi, 2020). Yet, structural barriers,

Figure 2. Community garden led by an *olla común* located in Santiago. Source: Authors.

such as lack of land, water access, and institutional support, limited their scalability, underscoring the uneven terrain on which community resilience is built. As one volunteer reflected on this:

> Since the pandemic began, we have set up community gardens in two different locations within the neighbourhood. Although they provide little in cooking, they can facilitate short supply chains. So where there is an *olla común*, there should be a community garden.

The act of collecting and transporting food itself is a form of labour that often goes overlooked. Volunteers frequently used personal trolleys, bags, or boxes to transport donations from *ferias libres* (Figure 3), reflecting a patchwork of material improvisation and social cooperation. In some cases, NGOs or neighbours lent vans to facilitate bulk collection from food banks like Lo Valledor, Chile's largest wholesale market. Beyond the pandemic, one NGO advocating for cyclists' rights mobilised its own vehicle to distribute food donations to *ollas comunes* throughout Santiago (Figure 4). As the leader of this NGO notes: "We often receive calls from *ollas comunes* asking us to use our van to collect food donations. They usually pay for the petrol, and then we organise a route together to distribute the food available."

This collaboration, coordinated often through WhatsApp, illustrates a creative reconfiguration of institutional and grassroots resources to meet urgent needs. These arrangements echo what McFarlane and Silver (2017) identified as the ways in which marginalised urban residents navigate the contradictions of urban life, while this reliance on community improvisation risks normalising crisis responsibility under neoliberal models (Kaika, 2017; Pelling & Manuel-Navarrete, 2011).

Figure 3. Collecting and transporting food donations in *ferias libres*. Source: Authors.

Figure 4. Collecting and transporting food donations in Lo Valledor food bank. Source: Authors.

Storage and refrigeration arose as critical infrastructural blind spots. Many donated items were close to expiration, and the lack of cold storage led to spoilage and waste. This gap between institutional assumptions about food donations and the material realities of grassroots distribution highlights the disconnect between formal food security frameworks and the lived experiences of communities in food deserts (Battersby, 2012, 2019; Battersby & Watson, 2018). This was corroborated by one participant: "During the pandemic, we received a lot of donations, often of poor quality. Many times we didn't have enough because the food spoiled before we could deliver it."

4.2. Cooking Together

The act of "cooking together" arises as one of the most symbolically and politically significant practices. At the heart of this practice is the pot. The pot itself acts as a socio-technical node (Callon, 2004), binding together ingredients, recipes, volunteers, and space into a dynamic assemblage of care (Figures 5 and 6). Participants emphasised the centrality of the large pot, both for its notorious utility in mass cooking and for transforming fragmented donations into warm and dignified meals prepared with care. A standard 50-litre pot can produce between 80 and 100 meals, a significant scale-up from the home-cooked meals volunteers are used to preparing for their families. This shift in scale poses both technical and embodied challenges. Volunteers usually have to learn through trial and error how to adapt traditional recipes, such as lentils, *carbonadas* (beef stew), or *porotos con riendas* (beans with spaghetti), to significant volumes and varying food inputs. Cooking becomes a collective and logistical act that requires skill, adaptation, and cooperation between volunteers.

Figure 5. Two large pots cooking *carbonada*. Source: Authors.

Figure 6. Large pot (up) cooking vegetables and large pot (down) cooking animal protein. Source: Authors.

The physical spaces in which cooking takes place vary according to the organisational structure of each *olla común*. More formalised initiatives, such as those run by neighbourhood committees or NGO facilities, often have access to essential infrastructure: large pots, gas cookers, utensils, and serving materials. These spaces are often embedded in community centres or existing kitchens, making them better equipped to respond to food insecurity during crises. In contrast, more informal or emerging *ollas comunes*, often organised around private homes, patios, or even streets, face significant infrastructure constraints. Many participants described transporting gas cookers to the street, setting up improvised kitchens, or cooking from their home kitchens and transporting meals afterwards. These improvisations speak to strategies of resilience and reveal how institutional systems assume a baseline of infrastructure that is rarely met in the urban poor (Nicoletti et al., 2023). As one participant explained:

> During the pandemic, sometimes we cooked in the community centre, sometimes in my house or even in the public square. Now that I have been elected leader of the organisation, we cook in my patio, which I have adapted for this purpose.

Cooking together during the pandemic introduced an additional layer of complexity. Volunteers had to interpret and adapt to government-imposed sanitary measures, such as physical distancing, lockdown restrictions, and the mandatory use of facemasks and hygiene products. Although these rules were put in place for public safety, they were often perceived as restrictive and impractical, especially given the lack of consistent access to basic supplies such as alcohol gel and cleaning materials. Meals were served in disposable containers and utensils, increasing both costs and waste. Interestingly, several eaters who depend on these kitchens started to bring their own pots or containers to deal with this issue. These adaptations underscore the relational and negotiated character of resilience (Béné & Devereux, 2023; McFarlane & Silver, 2017).

The process of cooking together follows a flexible yet coordinated rhythm. Menus are not fixed, but emerge from what has been collected, often dictated by the availability of vegetables or grains. As one participant noted: “It works like a house. First you see what you have and then you make the menu.”

Protein inclusion depends on financial donations, with lentils and legumes often substituting for meat. The preparation process usually involves at least two or three core volunteers, who met on average three times a week during the pandemic, and one day a week on average from 2022 to the present. Some focus on chopping vegetables for the *sofrito* (the aromatic base), while others prepare ingredients for the main pot. Cooking can take from two to four hours, depending on the recipe, the number of volunteers, equipment available, and the type of meal. Recent research confirms that traditional culinary preparations are often based on sustainable and nutritious practices (Tiboni et al., 2025). However, in the context of *ollas comunes*, it is still a challenge to meet food security and nutritional standards in terms of calories, fibre, and protein on a daily basis (Daniels et al., 2021).

Volunteers’ roles can vary from day to day, but the tasks are generally well distributed, from preparing the food to cleaning up and post-meal activities. As one participant cooking in a neighbourhood committee space confirmed:

> There are a lot of logistics involved, but the team of volunteers is well organised and knows how to deliver the meals on time. Once everything is done, we must tidy up and clean because other organisations also use the space.

Participants recognise that these roles have evolved to achieve gender parity compared to past versions of *ollas comunes*. Although cooking practices are still anchored in the knowledge and caring labour of urban poor women, as confirmed by feminist analysis (e.g., Gallardo, 1985; Hiner et al., 2022; Jirón et al., 2022), new groups such as men, young people, older people, and migrant communities are getting involved in collecting food, transporting and delivering meals. These routines often end with a shared tea or meal, providing an opportunity for emotional and political discussion and reinforcing bonds of trust and mutual recognition.

Thus "cooking together" in *ollas comunes* exemplifies the relational, embodied, and infrastructural dimensions of food systems resilience (McFarlane, 2009). It is a practice that transforms scarcity into solidarity, domestic routines into collective action, and marginalised spaces into sites of care (Guidi & Andretta, 2015; Tilzey, 2017). In line with feminist studies (Hall, 2020; Hayden, 1980; Kern, 2021), by starting from the point of view of those doing the work, primarily women, we see how the act of cooking is a clear example of how care is not experienced in the same way, nor does it represent the same burden for different social groups. This reflects and contests broader systems of governance, food infrastructure, and resilience.

4.3. Delivering Food to Eaters

Once meals are prepared, the next key activity in the organisational cycle of *ollas comunes* is delivering food to eaters. This step reveals complex dynamics of care, improvisation, and negotiation with institutional structures. During the Covid-19 pandemic, government-imposed restrictions on mobility and gathering significantly disrupted the logistics of food distribution. Unlike earlier waves of *ollas comunes* in the 1980s, when food was sometimes delivered directly to households or served communally in public spaces, during the pandemic times *ollas comunes* had to quickly reconfigure how, where, and to whom food was distributed. As one volunteer declared: "We knew who couldn't come to our *olla común*, so we went to see them. It wasn't just about preparing the food; it was also about getting it to our neighbours who needed it."

In more consolidated *ollas comunes*, spaces such as community centres, neighbourhood committees and NGO spaces were adapted to meet these new requirements. Participants described placing tables at entrances to act as a transition point between the kitchen and eaters. Informal queuing systems were set up, often coordinated by volunteers who managed both the order of distribution and compliance with distancing protocols. Meals were packaged in individual containers, either purchased by the *olla común* or brought by the eaters themselves (such as plastic containers or family-sized pots), to be taken away. Each portion was usually accompanied by fruit and bread, packed in bags for convenience. Volunteers coordinated this operation with care and efficiency, for example, one at the door to manage the queue of eaters and one to three others to transport the food from the pot to the table. After post-pandemic restrictions were raised, some participants admitted that they still used plastic containers and utensils for meals and encouraged queuing systems to organise distribution among eaters.

In more emerging *ollas comunes*, which often lacked access to the physical infrastructure to operate, alternative strategies were developed to meet public health needs. Some organisers mobilised large pots

using vans or bicycles, and set up temporary stations in public squares or streets to distribute meals (Figure 7). Others set up home-delivery systems to reach those most in need, particularly the elderly, disabled or street people, by going door-to-door or using trolleys and bicycles. This form of delivery, sometimes referred to as *ruta calle*, continued beyond the pandemic and in some cases evolved into monthly distribution of food boxes to vulnerable households. While these delivery practices are deeply rooted in care and solidarity, they also reveal institutional tensions. One of the major challenges faced by participants during the pandemic was navigating the bureaucratic requirements for movement under lockdown. The Chilean state required individuals performing critical labour to obtain formal authorisation through online permits, which were typically only available to legally registered organisations such as neighbourhood committees or NGOs. The need to partner with NGOs to obtain mobility permits illustrates how resilience is co-produced through negotiation with the inadequacy of institutional design with local realities (Dowler & Caraher, 2003; Ensor et al., 2018).

Figure 7. *Olla común* distributing meals and fruits to eaters in a public square in Santiago. Source: Authors.

Without access to state permits, volunteers were subject to surveillance and sanction by police and municipal authorities. Several participants reported being stopped or fined while delivering food to the most vulnerable population, ironically, for engaging in a form of labour that the state both recognised as essential and failed to adequately support. As research has pointed out (Kaika, 2017; Pelling & Manuel-Navarrete, 2011), communities are celebrated for their improvisation in times of crisis, yet penalised, in this case, for filling the state's inability to secure food for its population. In response, some *ollas comunes* formed alliances with formal organisations that could provide institutional cover. Volunteers were temporarily registered under the name of NGOs in order to access mobility permits and comply with state regulations. Today, although there are no state restrictions to prevent gatherings, there is still a police attention on *ollas comunes*, which are perceived as left-wing, radical organisations in some emblematic informal settlements in

Santiago. This dynamic illustrates how everyday activities are shaped and reorganised by relations of domination, and how actors navigate these structures and stigmas in practice.

4.4. Eating Together

The practice of "eating together" has historically been more closely associated with *comedores populares* (popular dining canteens) than with *ollas comunes*. In Chile, *comedores populares*, particularly those led by the Catholic Church, played a critical role during the economic crises and political repression of the 1970s. In a context where the Pinochet dictatorship banned many forms of grassroots and political organising, these spaces became sites of daily food access, but also spaces of social cohesion and mutual care (Gallardo, 1985). Similar models occurred across Latin America, such as in Peru and Argentina (Sordini & Arriola, 2023). In Peru, for example, self-managed *comedores populares* emerged in 1979 as a women's response to survival among the urban poor, but were institutionalised by the state in the 1990s, evolving into a hybrid model that combines state support and subsidised meals with ongoing community self-organisation (Sarmiento, 2017). In Chile, however, the institutionalisation of food support through *comedores* has remained more fragmented and primarily limited to church-led shelters and NGO programmes. These continued to operate in the urban poor, providing meals and shelter to homeless people. During the pandemic, when food insecurity increased, these *comedores* reached full operational capacity, demonstrating their importance in addressing food insecurity not only among the homeless but also among migrant communities and other vulnerable populations.

These distinctions between *comedores* and *ollas comunes* are not merely semantic; they reflect underlying institutional arrangements, legal recognitions, and access to infrastructure. Many participants in emerging *ollas comunes* expressed the vision to transform their spaces into *comedores*. This means places to eat together and to strengthen the social fabric within neighbourhoods. As one participant explained:

> Sometimes neighbours come over and we sit down together to socialise. We have tried not to turn it into a charity *olla*, but rather to give it social significance. To achieve this, we raise awareness of the reasons behind *ollas comunes*, why we cook for our neighbours and why they feel they need to come here for food.

However, these ambitions are often limited by a lack of formal infrastructure, economic constraints, voluntary unpaid work, and lack of institutional recognition. Without permanent kitchens, dining areas, or funding streams, *ollas comunes* typically rely on volunteer homes, borrowed venues, and short-term arrangements to operate.

These material constraints have also prompted radical and relational responses post pandemic. In several cases, *ollas comunes* have moved beyond the household threshold by reclaiming public space. For instance, using donated or rescued tables and chairs, some organisers temporarily set up dining areas on streets (Figure 8). For a few hours, the street becomes a reconfigured space of commensality, encounter, and solidarity (Klinenberg, 2018; Latham & Layton, 2019). These practices, while fragile and often precarious, challenge the institutional fragmentation of food support by reasserting the collective, relational aspect of eating. Moreover, this reappropriation of public space is not limited to meals distribution. Some *ollas comunes* have extended their presence to public squares in the evenings, handing out tea, coffee, and

sandwiches to people living on the streets or just neighbours who want to share a piece of bread. In these settings, eating together may take the form of a small, shared moment and a gesture of care (Hall, 2020). Volunteers and eaters often interact informally. This act reinforces the mutual recognition and horizontality that distinguishes *ollas comunes* from more institutionalised food aid efforts. As one participant reflected: "Something that is very significant for us is that today, three volunteers are people who came to the organisation asking for food. Now they are working with us inside."

Figure 8. *Olla común* appropriating public streets to cook and eat together with eaters in Santiago. Source: Authors.

Eating together can also be understood as socially and institutionally produced. What may appear as informal or improvised is, in fact, a strategic negotiation with institutional absence, where grassroots actors fill gaps left by the state while simultaneously working around the very structures that marginalise them. As one volunteer described:

> During the pandemic, I set up a table on the pavement in front of my house so we could all eat together. But as time went on, more and more people came, and I ended up occupying the whole street. Then I asked for a permit from the municipality so that I could operate in peace.

That negotiation illustrates how grassroots fill state gaps while navigating formal controls (Pelling & Manuel-Navarrete, 2011). These practices also illuminate how the intimate acts of cooking and eating together can be read as micro-political gestures embedded in broader institutional landscapes (Guidi & Andretta, 2015; Tilzey, 2017).

5. Discussion and Conclusion

In the context of overlapping crises, *ollas comunes* emerge as vital infrastructures for addressing food insecurity in urban food deserts. Using an IE lens, this study has traced the actors and everyday practices of *ollas comunes*,

shedding light on how food circulates through formal and informal networks of solidarity, and how these arrangements have evolved in the aftermath of the pandemic. In line with existing literature on the role of communities for strengthening resilient food systems (e.g., Campbell et al., 2022; McDaniel et al., 2021), the article offers valuable situated lessons, particularly given that *ollas comunes*—under a variety of names and forms—are widespread across global South cities (e.g., Bezerra et al., 2025; Leetoy & Gravante, 2021; Osuteye et al., 2020).

The research illustrates that central to the work of *ollas comunes* is a constellation of actors and evolving networks, including *ferias libres*, micro-food banks, local shops, NGOs, municipal agencies and, most importantly, the everyday work of volunteers, mostly women, and their neighbours. These networks reconfigured the urban food environment, transforming scarcity into solidarity through cooking together and care rooted in local knowledge, thereby providing a solid foundation for resilience and creating opportunities for innovation. For example, the collaboration between *ferias libres* vendors and *ollas comunes* not only ensured access to fresh food but also has contributed to a circular food economy by recovering food that would otherwise go to waste. This practice demonstrates the potential of community kitchens to facilitate the connection of alternative food initiatives to urban resilience.

What we note is that agility is a key factor in achieving durability. *Ollas comunes* prospered by being nimble and responsive, mobilising resources, adapting strategies, and activating informal partnerships to meet urgent needs. These socio-technical arrangements demonstrate how grassroots adaptability can rapidly transform material and social resources and thus reconfigure the assemblage. These findings are consistent with existing literature on the value of community resilience and the capacity to adapt in unjust systems (e.g., Allen, 2010; Ensor et al., 2018; Pelling & Manuel-Navarrete, 2011).

Digital communication technologies further enhanced these self-organising capacities. Through social media platforms, *ollas comunes* coordinated donations, shared surpluses, organised logistics, and raised funds for essential supplies such as gas, transport, and kitchen equipment. This emerging digital infrastructure, which remains active today, strengthens these local networks of solidarity, thereby contributing to resilience and mutual aid.

However, resilience is not uniformly distributed across all *ollas comunes*. More formalised initiatives—those with established organisational structures or stronger connections to institutional actors—were often better positioned to access government support, such as mobility permits during the pandemic and donations from food banks. In contrast, less formal *ollas comunes* operated under more precarious conditions. These groups typically relied on volunteer labour and informal donations, while grappling with limited infrastructure, irregular resource flows, and significant emotional burdens. This uneven distribution of resources and support reveals a hierarchy among *ollas comunes*, shaped by structural inequalities and institutional recognition.

Crucially, the role of women in sustaining these initiatives cannot be overlooked. While the composition of *ollas comunes* has become more diverse since 2020—with increased participation from men, youth, and migrant groups in food collection, distribution, and communal eating—the core practice of "cooking together" continues to rely predominantly on women. Their unpaid, gendered labour not only sustained households during the crisis but also redefined urban care practices and community resilience. This finding also echoes existing studies on caring labour in the public sphere (Jirón et al., 2022). Despite their heightened visibility

during the pandemic, post-crisis narratives often render this work invisible once again, underscoring the urgent need to recognise, support, and institutionalise women's contributions to urban transformation.

Building resilience across the different stages of food provisioning—collection, preparation, distribution, and consumption—requires greater attention to the structural inequalities that underpin food insecurity in marginalised urban areas. This finding resonates with existing literature on urban food deserts in the global South (e.g., Battersby, 2012, 2019; Battersby & Watson, 2018). Strengthening the socio-technical arrangements that support *ollas comunes* is therefore essential to enhancing their capacity to cope with and adapt to future shocks.

This study highlights several key lessons for policy and planning aimed at building more resilient urban food systems. Urban food deserts in the global South require particular attention, not only as a spatial analysis of the "absence" of food infrastructure, but also as sites of community resilience. Recognising how communities cope with scarcity provides critical insights into grassroots survival strategies and locally-led food access solutions. In order to design effective interventions, it is essential to understand how community-led mechanisms work. Rather than imposing top-down frameworks, policy and planning should recognise and support the embedded bottom-up coping capacities and adaptive strategies that already exist. In doing so, it is critical for policy makers to broaden their understanding of "infrastructure" beyond physical assets. People as infrastructure, coordination mechanisms, and the non-human actors involved in food acquisition, cooking, distribution, and consumption are equally important. Investment priorities should reflect this broader view, allowing for more responsive and context-specific resource allocation that builds resilience.

Moreover, as informal food systems play a critical role in meeting the needs of communities, especially in times of crisis, policies should recognise their value and promote better coordination between formal and informal networks to improve the overall effectiveness and responsiveness of urban food systems. Finally, increasing the agility of formal food systems is key. Rigid, centralised and highly regulated structures often fail to meet immediate, localised needs. Cities with more decentralised systems managed to maintain essential services during lockdowns, revealing the limitations of traditional infrastructure ideals and expanding our understanding of the crucial role of social networks in urban resilience. Learning from arrangements typically seen as temporary and unreliable is important because they have proven to be more responsive than formal systems. Building more adaptive systems that can respond quickly and equitably will be essential to supporting vulnerable communities and strengthening the resilience of urban food systems.

Incorporating these lessons into policy could foster more inclusive and context-sensitive urban planning. For example, rethinking land use to accommodate *ollas comunes* and community gardens could create shared spaces that support both food provisioning and social cohesion. Such integration has the potential to promote environmental education, strengthen community ties, and build more resilient, locally-rooted food systems capable of withstanding future crises. Moreover, the reclaiming of public space through collective food practices warrants deeper examination. These actions are not merely functional—they are deeply political. They operate as everyday forms of resistance that challenge dominant urban imaginaries and assert community agency in contested spaces. However, it is equally important not to romanticise or over-idealise the role of *ollas comunes*, particularly in contexts where food resources are present but unevenly distributed. Their existence should not obscure the state's fundamental responsibility to ensure the right to adequate food for all residents, in every neighbourhood. As highlighted in the literature (e.g., Humbert & Joseph, 2019;

Kaika, 2017; Pelling & Manuel-Navarrete, 2011), an over-reliance on community resilience to address systemic crises may reflect the ongoing failure of state institutions to fulfil their obligations. Furthermore, *ollas comunes* themselves can risk reproducing the very injustices they seek to challenge, particularly when they operate without adequate support, recognition, or integration into broader food governance frameworks. This tension points to the need for further research into the relationship between resilience and justice in the context of food deserts.

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Conflict of Interests

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ARTICLE

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Changing Food Places: Shifting Food Acquisition Practices of Pensioner Age Households and Food Insecurity—A Secondary Analysis

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Abstract

The UK food system has been subject to a range of external pressures over recent years, and particularly influenced by austerity policies, the Covid-19 pandemic, exit of the UK from the European Union, geopolitical instability, increasing energy prices, and cyber attacks. These disturbances have resulted in high levels of inflation and a cost-of-living crisis, presenting challenges to household budgets and food affordability. Support structures that have traditionally supported pensioner age households (PAH) to access food, such as community lunch clubs and meals on wheels services, have been adversely affected by austerity measures, and thus have been in decline since 2010. Many community lunch groups which were forced to close during the pandemic have not re-opened. This article explores how disruptions to the food system have impacted how PAH interact with the food places and spaces they have traditionally relied on. The challenges presented by food system disruptions are explored through a secondary analysis of and critical reflection on data from four empirical qualitative studies undertaken in the south-east of England over the past decade. This secondary analysis focuses on place, in particular, in relation to changes in food acquisition practices. Both the studies and exploration are underpinned by a theoretical framework developed to model food system vulnerability in later life. The studies include an ethnographic study exploring the vulnerability of older people in the UK food system undertaken before the pandemic, two studies exploring food practices undertaken during the pandemic, and a study undertaken post-pandemic examining the use of food aid by older people. These studies demonstrate how the places PAH use to source food are in flux. The cost-of-living crisis has led to an increase in the number of older people using food aid such as food larders, social supermarkets/pantries supplying surplus food, and community cafes producing low-cost or free food. However, these sources do not meet all their food needs and are supplemented by purchasing food from supermarkets. This increases the complexity of the food environment PAH on lower

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incomes engage with and could amplify their risk of being food insecure. Governments and food providers need to be better prepared for future major disruptions to the food system, and be particularly aware of, and be prepared to support, the needs of PAH.

Keywords
food insecurity; Food Security Framework; food system; older people; vulnerability

1. Background: The Rapidly Changing Food Landscape for Pensioner Age Households

Before the Covid-19 pandemic, the UK food system was relatively stable and generally able to respond to disruption to parts of the food system. A number of historical food "scares" relating to the food safety of particular foods, such as the BSE in beef and salmonella in eggs crises (Roslyng, 2011), did not cause too much disruption for consumers but had a major impact on public trust in the food system (Wales et al., 2006). However, over the past five years, the UK food system has been subject to a series of major threats beginning with the Covid-19 pandemic (Brown et al., 2022). In the immediate aftermath of the pandemic, a further series of geopolitical challenges have had major impacts on the food system including exit of the UK from the European Union (leading to increased food prices due to increased bureaucracy when food is imported from Europe; Lang, 2019); geopolitical instability following the invasion of Ukraine which led to increasing energy prices and food price inflation (Meadows et al., 2024); and cyber attacks (Hamilton et al., 2020).

Even before the pandemic took hold, in 2010, the UK Conservative and Liberal Democrat coalition government pursued a fiscal policy of austerity, which was extended when the Conservatives regained power in 2015 (Wren-Lewis, 2024). The government's aim was to reduce the financial deficit by reducing the size of the state (Wren-Lewis, 2024). The result was a reduction in local authority budgets of 23.4% between 2009–2010 and 2014–2015; however, these cuts were not uniformly applied, with more deprived areas experiencing more severe cuts in budgets (Innes & Tetlow, 2015). Austerity policies thus increased the already drastic social divides across the UK. Toynbee and Walker (2020) described the impact of austerity as "The lost decade". Budget cuts had a devastating impact on services that local authorities did not have a statutory duty to provide, including meals on wheels (MOW) services (or lunch clubs) for older people (Dickinson et al., 2021; Loopstra, 2020). As a result, between 2010 and 2024, there has been a catastrophic decline in MOW services (National Association of Care Catering, 2023).

These crises have resulted in high levels of inflation, which have had a major impact on food prices, with basic foods such as pasta and bread, that many people on low incomes are particularly reliant on, increasing drastically and often doubling in price (Food Foundation, 2022). Historically, much research on food insecurity has focused on people with families (e.g., Renard et al., 2024). Recently, food aid organisations have reported seeing an increase in pensioner age households (PAH) seeking support with food. The UK Trussell Trust note that although the prevalence of poverty in PAH is lower than in households with working-age adults, 6% of support provided by food banks goes to PAH (Trussell Trust, 2024). They report that food bank support for PAH has increased by 345% between 2018–2019 and 2023–2024. The Trussell Trust reports that the main reasons older people access their food banks are due to income/debt (77%) or health (28%). The Independent Food Aid Network, representing independent food banks, have also seen an

increase in PAH seeking support, noting that "Age UK is referring far more elderly people for help than ever before" (Independent Food Aid Network, 2023).

1.1. Pandemic and Food Insecurity

The pandemic provided economic, welfare, and technological challenges affecting all parts of the food system, resulting in massive disruption to the supply of food to households (Thompson et al., 2022). Major impacts resulted from supply chain disruption, compounded by panic buying by those with the financial resources to enable them to stockpile food and other commodities (Pantano et al., 2020). This led to supermarkets with empty shelves, leaving vulnerable people exposed, as supermarkets struggled to balance supply with demand. Media coverage showing older people standing in front of whole aisles devoid of food products shocked viewers unused to seeing this scale of missing food (Wilson, 2020).

For PAH, public health-led responses to the pandemic aimed at reducing the spread of the virus forced them to make changes to their food practices, where they acquired food from, and how they were able to use the built environment, including spaces where they were used to purchasing and eating food (Thompson et al., 2022). In particular, the public health changes required to contain the virus resulted in disruption to their supermarket shopping routines, forcing many to make a move to online shopping for the first time.

1.2. Change to Online Shopping

In the UK, supermarkets are the main place people traditionally source their food (Thompson et al., 2013). Exploring the rapidly changing shopping landscape, Brand et al. (2020) undertook work to explore shopping behaviour and found that those most resistant to, and least likely to do online shopping were more likely to be older and retired people who were less time pressured. Older participants expressed a preference to see and touch goods before purchasing, tending to be brand loyal and price conscious. Prior to the pandemic, before March 2020, only 10% of grocery shopping (all ages) was conducted online, rising to 16% during the lockdowns, and is currently 13% (Bayford, 2023). Bayford reports that millions of people have permanently switched to doing their weekly food shopping online (Bayford, 2023). A report by Mintel (2023) found that two-thirds of UK consumers used online shopping to avoid shopping in-store, 20% to avoid having to transport items themselves, and 25% to bulk buy items. Ball (2025) looked at shopping grocery trends over the five years post-pandemic, noting:

> We haven't gone back to old patterns and shopping trips remain below pre-pandemic times. Households made one less visit to the supermarket in February 2025 than in 2020, while online shopping appears to have stuck, taking a 12.3% market share this month versus 8.6% in February 2020.

Those undertaking in-person shopping reported that the social aspects of shopping are important (Tyrväinen & Karjaluoto, 2022). Hassell (2024) undertook a survey reporting that 55% of over-65s now shop for groceries online, and for one in five this is a new food practice developed during the pandemic. Those with age-related impairments such as visual, hearing loss, and mobility issues spend 11% more money than those without. However, the survey found that over-65s felt that retailers providing online shopping failed to address their needs, leaving them struggling with difficult-to-read text, confusing site navigation, with sites not allowing sufficient time before timing out, and they struggled to remember passwords.

1.3. Food Security Framework

There have been relatively few studies exploring food insecurity in older adults (Dickinson & Thompson, in press). Food insecurity in later life can be caused by a number of factors (Scientific Advisory Committee on Nutrition, 2021), including a decline in functional ability, bereavement, and reduction in social networks, not just financial threats, with an estimated 300,000 in the UK requiring assistance preparing a hot meal (Papadaki et al., 2023; Purdam et al., 2019). Dickinson et al. (2021) carried out an ethnographic study designed to explore how PAH might become vulnerable within the food system and found that PAH experienced a number of challenges (or threats) that shifted them towards food insecurity. The authors used the findings to develop a Food Security Framework to support those trying to understand the process of development of food insecurity for older households (Dickinson et al., 2021). This study identified threats that, while on the surface appeared to be relatively minor issues, could accumulate with other threats to push PAH towards food insecurity. Threats to food security included access to suitable parking, clean and accessible toilets, lack of seating in retail spaces, presence of obstacles in supermarket aisles, and lack of help and support from supermarket staff. Conversely, PAH were able to protect themselves from food insecurity through accessing services that focused on supporting PAH to access food as well as providing social activities to help address loneliness. Services that were being used by PAH to prevent food insecurity included lunch clubs and MOW services, however, use of online food deliveries by older people in this study was rare. Most participants explained that their weekly shopping trip was something they looked forward to. Shopping trips provided social opportunities as well as providing engagement with spaces outside of the house and physical activity.

The Food Security Framework (Dickinson et al., 2021) developed a four-domain model originally proposed by Schroder-Butterfill and Marianti (2006) as a way to understand how older people exposed to the same environmental threat experienced the event differently, with different outcomes dependent on their exposure (or socio-cultural assets acquired over their lifecourse) and their coping capacity. Environmental, public health, and economic crises impact differentially on the population, with those from lower socio-economic households and other disadvantaged groups, such as those with disability and reduced access to resources, being worst affected (Schroder-Butterfill & Marianti, 2006).

In addition to supporting understanding of how people could move to a bad outcome, in this case, being food insecure, the Food Security Framework also indicates where interventions could be made to support households to achieve food security. For the purposes of this article, the focus will be on both the threats experienced by PAH, how PAH respond, and the way this affects their engagement and interactions with food spaces. The Food Security Framework was used as an analytic framework in three of the studies included in the qualitative secondary analysis (QSA) that is the focus of the article, as well as for the QSA presented. The article will explore how the food practices of PAH have been affected, how PAH appear to be responding to this "perfect storm" of food system challenges, and make recommendations for changes that will support PAH to access affordable and healthy food in a socially acceptable form.

2. Studies of Food Security: Methodological Design

The article presents a QSA which draws on data from a series of four studies, largely drawing on ethnographic methodological approaches (Hammersley & Atkinson, 2007) that explored the vulnerability of older people in the UK food system, undertaken over a decade (summarised in Table 1).

Table 1. Summary of included studies.

Study	Aims	Methodology	Methods	Sample
Dickinson et al. (2021) Dickinson & Wills (2023) (Both papers report findings from the same study)	To investigate how older adults access food, and to explore social capital, which might contribute to food security or prevent malnutrition.	Ethnographic	Multiple methods including: participant-led kitchen tour, observation of food acquisition practices (photographs/video), diary, and informal interview.	25 households with an older adult.
Wills & Dickinson (2022)	To explore the role MOW plays within the everyday food lives of older people.	Ethnographic	Observation, interviews and visual methods (photography). Study disrupted by the pandemic, and methods shifted to telephone interviews.	Included interviews with 14 households receiving MOW.
Thompson et al. (2022)	To understand how Covid-19 affected local food systems and household food practices, and efforts to mitigate dietary health inequalities in the east of England.	Qualitative study	Online and telephone interviews.	Included interviews with 12 households with older people.
Dickinson et al. (unpublished data)	To explore the current food aid landscape available to, and being used by, PAH in the UK.	Ethnographic	Observation, interviews.	Included interviews with 19 older people.

The first study was undertaken before the pandemic and included 25 older households (Dickinson et al., 2021; Wills & Dickinson, 2023) to explore the food practices of PAH with a particular focus on their vulnerability within the wider UK food system. This multiple-method, ethnographic study explored everyday interactions of PAH with the UK food system through a series of visits. Data collection began with a householder-led tour of the kitchen space, which included exploration of food stores in kitchen cupboards, fridge, and freezer, as well as other appliances used in food preparation, captured using photographs and video recording. Subsequent data collection included a "go-along" video-recorded shopping trip, a trip to an allotment or garden used in food production, informal interviews, and observations of cooking practices.

Two studies were undertaken during the pandemic, the first looking at MOW (n = 14 PAH; Dickinson & Wills, 2022) began before the pandemic and followed a similar methodological approach to the one described above. However, the approach had to be revised due to the pandemic, shifting to data collection using telephone interviews to limit risks to vulnerable participants and researchers. The second study exploring food security during the pandemic included 12 PAH (Thompson et al., 2022) and involved interviews undertaken via telephone or online via Zoom. The final study was undertaken post-pandemic, and aimed to examine the use of community food support by older people (n = 19 older people).

The empirical part of the study included participant and non-participant observation in community food settings, and interviews with older people and others involved in providing food support.

Data for each of the four studies had previously been transcribed and coded using the QSR NVivo software to facilitate analysis by study authors. All studies had been given ethics approval.

QSA is defined as the "re-use of existing qualitative data generated for previous research studies" (Hughes, 2023), an approach which, despite a number of issues, is increasingly being used. Secondary analysis of existing data is used to re-examine existing data rather than funding the collection of further primary data. Secondary analysis has been used widely for quantitative data sources, but the approach has been viewed as more problematic for qualitative data, with one of the main concerns being epistemological, due to the nature of these data being highly contextual, generated and co-constructed by the researcher with participants (Hughes, 2023). Hughes presents a strategy to support researchers to reuse data, and overcome the associated issues, including the need for the QSA researcher to familiarise themselves with the datasets and context of the studies. Hughes proposes two strategies of (re)contextualisation and (re)connection to support the QSA.

The (re)contextualisation of data involves critical engagement with the contexts of the original studies. (Re)contextualisation supports this by addressing questions such as the temporal nature of the original data, the social contexts within which data were produced, and the limits of such data, while (re)connection explores how data can be used beyond the original context of the data through examining the researcher's connections to the data and context, exploring how the datasets can be developed in the new analysis, and positively using the "distance" from the original study:

> Seeing data with a new temporal perspective can enhance understandings of social processes…and provide fruitful ground for exciting and innovative research generating new findings and insights. (Hughes, 2023)

Some of the issues described above are less relevant to the QSA undertaken here, as the author had intimate knowledge of all four studies, being involved in study design, data collection, and analysis, with full access to the primary data. All four studies were selected as they were focused on the social contexts of vulnerability in aspects of the food system for PAH. The four studies were located in similar geographical contexts in the east of England.

The temporal distance from the earlier studies offered analytic advantage by enabling a fresh perspective through distance from the data. Drawing on studies undertaken at different times enabled exploration of temporal changes in food practices. The QSA was undertaken using a process of interpretative analysis (Dickinson et al., 2021), which supported the critical re-examination. Data were re-examined through a process of re-familiarisation with the study data, by re-reading and exploring the data coded within the NVivo files, but additionally, the researcher re-read the original transcripts and re-viewed some of the visual data. For some of the studies, summaries of households had been written, and these were also revisited. Analytical notes were taken that had relevance to addressing the questions of the QSA and used the same theoretical framework that had evolved from and underpinned three of the previous studies to inform the reanalysis.

3. Findings

In this part of the article, data from each of the empirical studies will be presented chronologically, to show the changes in food practices over time. As each of the studies is focused on different participants rather than following the same participants over time, these findings should not be read as a longitudinal study. This analysis highlights changes in the way PAH appear to be interacting with the food environment and using food spaces/places. The article offers an insight into how PAH are managing food security in response to different food system challenges as they change over time.

3.1. Before Covid

In the first study (Dickinson et al., 2021), none of the participants used online supermarket delivery services, preferring to shop in person. One man ordered food from a specialist frozen food delivery service, using their catalogue and placing his order by telephone. Some PAH were supported with food procurement by family and friends, received MOW, or used lunch clubs. Most participants, including those with mobility issues, preferred to choose their own food and shop for themselves, generally in larger supermarkets. They described the benefits they felt food shopping offered to them. Many people described how shopping in supermarkets posed challenges for them, from dealing with poor parking and public toilet provision, to the ever-changing store layout, and obstacles experienced within the store, e.g., floor cleaning signs and trolleys being used to collect food for online deliveries. Lack of simple provisions that could support them, such as provision of seating, meant there was nowhere for them to have a short rest partway through their shop or before they headed home. Some of these issues are illustrated below.

Janey, aged 80, lives alone, since her husband died four years ago. She has multiple health problems and poor mobility, using a walking aid with a built-in seat when she leaves her home. She goes food shopping on the same day most weeks after visiting the hairdresser next to the store, travelling there and back in a local taxi. Janey explained how she had previously used the bus but can no longer get on it with her wheeled walking aid. Her walking aid has a built in seat which allows her to rest her shopping basket on it as she walks around the shop, moving the basket to the floor if she needs to sit and rest on her way around.

Her main food needs are met by a daily MOW service delivered to her home. They deliver a hot midday meal, leaving a sandwich and cold snacks for later. Janey started using MOW after her husband died and her GP recommended it as she was feeling very depressed. She explains that MoW give her independence so her sons can get on with their lives. Janey also has milk delivered three times a week. Accessing these services means that she needs to purchase very little additional food each week, which makes the shopping trip manageable. Very little food is found in the house with nothing in the freezer. There are yoghurts in the fridge, but her cupboards contain mostly out-of-date food items from before she was having MOW. Though shopping is clearly a struggle, she is not interested in shopping online as it's important for her to be "independent":

> I suppose at the back of your mind you think to yourself "Well, you must keep active," and this is why I would never have food delivered, one of the reasons, I mean, I enjoy going out shopping, but I'm selecting food and that sort of thing….If you can go out and choose exactly what you want instead of a box of stuff landing up, and it's just totally antisocial for a start, you're not meeting anybody and you're not getting any exercise.

She appreciates help from store assistants:

> And one in there [assistant], she said, "If you need anything off a top shelf just ask because you won't be able to reach them."

Nancy, who is 90 years old, also lives alone, driving her car to go shopping, occasionally taking the bus. She uses a range of supermarkets, choosing the stores for their ease of parking. She grows her own fruit and vegetables, cooks from scratch, and makes jams and cakes. She occasionally uses a local butcher and other local shops. She explains that supermarkets moving things around make her life more difficult. She uses the seats provided in the supermarket to have a rest before heading home.

Dexter is aged 78, and lives alone in a ground floor flat, has significant vision loss due to macular degeneration (which affects central vision), mobility problems, and is worried about falling. He still cooks his own food, sometimes with the help of a carer. His health issues have an impact on how he is able to interact with the built environment. For example, he has had to give up driving, and as his mobility deteriorated he found he was struggling to use the bus to get to his favourite supermarket. He now has a carer who accompanies him on shopping trips to help him to navigate the supermarket environment to find food. He walks from his flat to the nearest supermarket using a walking aid with a built-in seat. He has to navigate a series of obstacles *en route*, in particular, cars parked along the pavements, which force him to walk on the road. This adds an additional layer of precarity to his trip. Once in the supermarket, further obstacles impede his food shopping, including other shoppers moving in front of him, aisle trolleys being used by staff to restock shelves and collect food for online shoppers, as well as temporary signage marking hazards such as wet floors. His visual impairment makes it difficult to get around the store and find the food items he needs:

> I can make the aisle out and things like that, yeah, but when it comes to reading that notice up the top [overhead signage], that says what's in the aisle, you know, I can't see it.

These three participants explain how a number of factors affected their ability to access supermarkets as well impacting on their retail experience. These influence their choice of food store, and though proximity to their home was a major factor, it was not the only influence. Though Dexter now used the nearest supermarket geographically, for him this was a compromise. Another participant, James aged 70, lives with his wife who is still in employment. Since he retired, he has taken on the food shopping task. He has a car, but thinks he will give it up when it fails the MOT (a mandatory annual check to ensure cars aged over 3 years old are roadworthy). He chose not to use the nearest store for political reasons. He selected his shopping venue based on both price and proximity, as Sainsbury's is at the other side of town, and he thinks the additional travel is not worth the hassle:

> Partly it's the easiest one to get to, of the main supermarkets. Sainsbury's is on the wrong side of town and the traffic jams are terrible just getting through the town and it's quite a long way round, by the time you've paid your petrol and added that onto the bill there's no point. There's a new Tesco's, I'm not a fan of Tesco's for political reasons but I will use them in an emergency but not as a matter of course.

James was also averse to online shopping but explained that he might move online if he gets rid of his car.

Clearly supermarkets could make simple, and relatively low-cost changes to support PAH to continue to access stores, which would have commercial benefits for them (International Longevity Centre UK, 2023).

3.2. During Covid

Older people, and those who provided support for them, described facing a number of additional challenges during the pandemic; these were particularly focused on avoiding in-person shopping in-store (Chenarides et al., 2021). Changes made to food acquisition practices included: being unable to physically access supermarkets due to being asked to shield; anxiety and fear of contracting Covid-19 if they went shopping; and being unable to join the long queues that formed outside supermarkets and other shops as the numbers of people in-store were restricted. Two studies feature in this section. The first study was underway as as the pandemic began (Dickinson & Wills, 2022). The second study was designed to capture data to enable an exploration of the impact of the pandemic on food practices (Thompson et al., 2022). Pandemic restrictions had consequences for PAH, including loss of independence in relation to food procurement with a resultant decline in physical mobility and lost opportunities for social interaction. Older people were identified as a demographic group that was at higher risk of adverse consequences if they contracted the Covid virus. In addition, some older people had been diagnosed with health conditions that enhanced the risk of severe outcomes from an infection, and these households were asked to take additional precautions to prevent contracting an infection referred to as *shielding*.

The first study presented here, explored older household's experiences of using a meals on wheels (MOW) service and was underway when the pandemic began. Though no longer a universal service in the UK, in some geographical areas a thriving MOW service exists, and the study on MOW (Dickinson & Wills, 2022) was underway in one of these areas. This study provided evidence for the ability of an MOW service to shore up the coping capacity of PAH both before, but especially during the pandemic. Demand for services such as MOW increased dramatically as the pandemic took hold, as people were desperate to secure their food supply. As the MOW service was well established and already serving a large population of PAH, it meant that many vulnerable PAH were already receiving support in the form of MOW to maintain their food security as the pandemic hit (Dickinson & Wills, 2022).

Those receiving MOW described experiencing a range of challenges to their food security, which had led to them using the MOW service. Challenges included increased frailty, or cognitive or visual issues, which had affected their ability to safely cook hot meals. They described the MOW service as a "life saver" which had enabled them to live independently in their own homes before the pandemic. All participants had experienced a move towards a more vulnerable position in relation to food security, which accessing the MOW service was able to help reverse.

MOW have been decimated across the UK following austerity policies, with many areas no longer providing this service. Carol, who lived alone with no family living nearby to help with food shopping, had started to receive MOW after surgery. She expressed both relief that she lived in an area where there was still a MOW service, along with concern for PAH living where there was no service operating:

> I was told recently that some places don't even have them. Well I wonder how on earth do the poor people manage?

One of the benefits PAH assigned to MOW was the feeling of safety that a daily visit engenders. The relational care developed through a series of brief encounters between clients and those delivering food is valued by PAH, making them feel cared for and helping reduce loneliness.

Those interviewed at the onset of the pandemic explained how they were aware of the challenges other PAH were facing as they saw pictures of empty supermarket shelves as a result of panic buying and disruption in the food system, but felt relieved that they as recipients of MOW were more protected than others. MOW staff were concerned about how clients' contacts with the outside world had reduced drastically, and the consequences this isolation would have on them.

MOW clearly supported the food practices, food security, and agency of PAH, so it could be described as a community asset that supported food security for those using this service. An additional value of this study was being able to study PAH in receipt of MOW during a major societal disruption, and the way that receipt of MOW protected clients from the negative disruption affecting wider society.

The second study in this section explored the impact of the pandemic on food practices including older people. Older people and those working to support them reported a range of challenges around food shopping resulting from adherence to public health guidance and restriction of contact and movement during the lockdown phases. These included reliance on others to do food shopping, and the resultant loss of agency and control over food shopping. Many PAH reported not wanting to make too many demands on others. PAH said they tried to avoid asking too often for food shopping, or felt guilty that they were putting others at risk of catching the virus. People described restricting the amount and type of foods they requested to the extent that some people reported unintended weight loss. Robert aged 72, who lived with his wife, had been advised by his doctor to "shield" due to a medical condition that made him particularly vulnerable to the virus. He explained:

> Then I got the letter saying that's it for 12 weeks. So we thought, well how are we going to get to the supermarket? How are we going to get stuff? We've got a neighbour….So she, for the first three weeks, did our shopping….She's got two little kids…and we felt really guilty that she might be going out and catching coronavirus on our behalf…so when we asked her to get stuff, we asked for the bare minimum.

Many people avoided supermarkets (in-store and online) altogether, shifting their place of shopping solely, or mostly, to local stores within walking distance of their homes or those which provided a delivery service. This sometimes started as a short-term response by individuals to avoid busy supermarkets, food shortages, and long queues. As the Covid-19 mitigation measures and restrictions continued, this strategy became a point of pride because it meant engaging with and supporting local businesses. We do not know if these changes have been sustained post-pandemic.

Some people had received official notification that they should be "shielding" as they were deemed clinically vulnerable. This meant that they should have been entitled to priority delivery slots with larger supermarket chains; however, there was uncertainty about how to access these and whether they were eligible. Judith, aged over 70 years and living alone, with a long-term health condition, describes the difficulty she had understanding the process and obtaining a priority delivery slot:

> And there were some special slots that weren't there [sic], but were they just for people who were shielding? I wasn't quite clear when I talked to different people about how easy it's been to get those….I have no idea how you got them.

As online shopping replaced in-person shopping, there was increased demand for shopping slots, but it excluded many, in particular those PAH who lacked digital skills. Supermarket systems could not make the transitions required at the pace needed for a large-scale switch from supplying food in-store to food delivery. Although some PAH switched to online shopping, for others this was a challenge and they were reliant on family members to arrange this. Abbie who lives with her family next door to her older parents explained how she was supporting them to access food:

> My parents live next door, they are 84 and 78, and they tried to do online shopping in the first week of lockdown, but they couldn't manage, so I have been doing all their shopping [online] for them since whatever date in March.

The experiences of participants reflected some of the lack of preparedness of the UK food system for a crisis of this nature.

3.3. Post-Covid

The final study, undertaken after the pandemic, explored the experiences of PAH using food aid. The study was undertaken in response to reports of increasing numbers of older people presenting at food banks. The restriction of the winter fuel allowance in the UK to those in receipt of Pension Credit (paid to those with no private pension, the benefit had previously had been paid to all PAH) was announced during this study. This government policy decision made for the winter of 2024–2025, was raised as a concern by many of the PAH we talked to. This policy change prompted some to seek out food aid to maintain their food security. Food aid is defined as "any type of aid giving activity which aims to provide relief from the symptoms of food insecurity and poverty" (Lambie-Mumford et al., 2014). PAH described being very conscious of increasing food prices and how these added pressure to their household budgets, with some struggling to afford to buy food from supermarkets and many restricting the use of heating in their homes. In the previous studies, food banks had explained that they did not really see older people accessing their services.

Participants using social supermarkets/food larders (where people pay a small membership fee in exchange for a number of food items, generally food surplus) were generally positive about accessing the services. However, the items of food available are variable, and participants described being able to find some but not all of the foods they needed. None of the PAH described being able to find all the food they needed from community food sources; rather, it supported their budgeting by providing some of the food they wanted. Rose who is 70 years of age, and lives alone explains:

> With £14 a month you get quite a lot actually. But once you go there, you find [sic], and it's always useful stuff, yes… Because they don't get the same thing every week, no. So…one day you get cereal, another day, you get milk. So yes, it helps.

Participants explained that they had found out about the larder through informal means such as word of mouth, and how they had previously thought it was a foodbank and not for them. Add-ons such as community cafés or low-cost or free meals were popular, and may have begun to replace lunch clubs. Elsie who is aged 79 and lives with her younger husband who is still employed, explained how she really enjoys the social aspects of the larder as well as benefitting from saving money:

> I'd never heard of the larder before we joined. I joined the larder. I kind of assumed when I first heard about it that it was a bit like a food bank, you know, means-tested kind of thing. And I must tell you it's revolutionised not only our shopping, but our budget. I cannot believe what a difference it's made and how lovely it is. You know, it's such a nice experience.

As the food offered is so variable, it can be difficult for those with specific dietary requirements to find food they are able to eat. Mike aged 66, who lives on his own and retired early due to experiencing a number of health issues explains that he uses the larder as he is struggling financially. He uses a mobility scooter. His medical conditions include diabetes and kidney failure which require dietary management, limiting the food he can use:

> Well, I've got kidney disease as well. I have to eat stuff that is fresh or hasn't got any potassium in it, so I can't eat bananas, tomatoes. There's lots of foods with potassium in it. I've got a very limited diet. I can't use any processed food. You've just gotta be really careful and it's not cheap. It's usually a meat, loads of vegetables. I've got. [sic] I don't take everything [from the larder] because a lot of it I can't eat.

Community food support varies substantially in what they offer, with some requiring people to queue, and some PAH struggled to carry food home. Rose explains how carrying the food from the larder could be difficult for some people:

> And the bags are quite heavy when you take them out at the end, and if you are an elderly person, you can't always carry these on and off of buses. It must be harder for other people, I don't know if they could do a service where people pick stuff up for them or something, but then it's going to be costing people money.

Use of food banks is frequently associated with stigma and shame, particularly by older people (Purdam et al., 2019; Slocombe, 2023), and this was reflected in this study, e.g., Mary who works in the voluntary sector commented:

> I think there still needs to be a lot of work around the poverty stigma of it. You shouldn't feel embarrassed to go to a community fridge, social supermarket, a meal. It's sad that people will avoid getting the help because of that.

However, Pat aged 74, who lives alone, explains that she is not ashamed of using a food bank:

> It doesn't bother me at all. People look down and think, "Ohh well ohh you go to a food bank?" And it doesn't bother me. Why should it?

Food quality and short use-by dates on food were brought up as an issue by some PAH and raised issues of food safety that require further exploration. Short-dated food stuffs could promote engagement in unhealthy risk-taking in relation to expired food, particularly for those who have other medical conditions or who are immunocompromised. Vera, aged 79 who lives alone, explained a change in the quality of food on offer in the Larder she attended:

> When it [Larder] first started, we used to get a lot of things like fresh meat every now and again. And lots of things that were handy to use like the meat might last you for two days, and then you could do two different things with the meat. Then all of a sudden that seemed to die off and now some things are a bit past their sell-by date. And they were sort of so bad that you really couldn't use them. But I don't think the people that donated them should have even had the cheek to sort of pass them on because they were really quite bad and you couldn't really use them.

As community food support is unable to fully meet PAH food needs, they still need to purchase food items to meet their needs. This means additional food shopping journeys, adding complexity to food acquisition practices. Therefore, food aid can only contribute to the food needs of those who have the skills and competency to respond to varying food options, as well as the physical ability and stamina required to take advantage of these kinds of community support.

4. Discussion

Recent macro-level threats impacting the UK food system have led to a cost-of-living crisis, resulting in major and rapid changes to the food practices of some PAH. The pandemic exposed the shortcomings of government policies regarding food welfare and the reliance on the voluntary sector to support those who are food insecure (Barker & Russell, 2020). Broadbent et al. (2023) note that this may be the first of many crises, given the economic and climate issues facing the UK; thus, it requires an understanding of the type of policies that can most effectively support the most vulnerable households.

This QSA highlights how PAH can be particularly vulnerable within a rapidly changing food system. As well as the financial threats experienced by all households, PAH are subject to other factors that amplify their risk of food insecurity and restrict their ability to accommodate rapid change. A changing food system and policy landscape add to the threats that some PAH are already experiencing and can shift them towards a vulnerable state. These include physical and mental health issues, but also structural factors such as access to transport and a supermarket environment that is not designed in an inclusive way to support PAH to continue to shop in their preferred place. Community food support is increasingly being used by PAH to support their food security, but currently has not adapted to accommodate their needs.

The cost-of-living crisis is continuing to affect PAH, and recent changes, e.g., loss of the winter fuel allowance for many PAH (reversed in 2025 following political pressure), pushed more of these households into food insecurity and towards reliance on support to access food. Analysis of the impact of winter fuel payments in the UK found that they increased the quality of life for poorer PAH, those living in the north of England, and people living in newer homes (Cartagena-Farias et al., 2024). The announcement of the restriction of the winter fuel allowance to only those older people who are in receipt of Pension Credit came with little notice for older people to make preparations for the sudden reduction in income.

The Covid pandemic both amplified as well as added additional threats to those already being experienced by PAH who were struggling before the pandemic. The pandemic rapidly shifted a large number of PAH who were living independently without any notion of vulnerability into a vulnerable state. A rapid shift in food practices resulted in people being forced to change the places they were familiar with in relation to food procurement. People moved to different modes of food acquisition, such as online shopping, and became reliant on social networks or organisations that were supporting individuals in their communities to access food. Some people changed food suppliers—either using different supermarkets, or moving to local shops and farm shops. Although we know that the levels of online shopping dropped after the lockdown phases, a substantial number of older people continue to access food via this mode. It is unknown what the longer-term impact of this shift is. We do not know whether this impacts levels of social isolation or physical activity and mobility. Older people were disproportionately and adversely affected by the Covid pandemic, and policymakers and food providers need to be better prepared for any future major disruptions to the food system. The pandemic highlighted the value of local services that deliver prepared hot meals (MOW) directly to vulnerable households, and the decimation of these services across the country should be reversed.

Over a decade of austerity policies weakened the capacity, resilience, and preparedness of community-level formal services that would have supported PAH in the past, and reduced their ability to respond rapidly to the pandemic in order to support vulnerable people. As state responsibility and action have declined, responsibility for supporting people with food has fallen to the charitable sector, which has grown rapidly to fill the gap. Food aid organisations are often begun in response to concerns by people driven by concerns about food insecurity or the environment and reducing food waste. Therefore, there are a wide range of interventions, with diverse operational styles and different approaches to supporting vulnerable people. The number of PAH using food aid services, particularly food banks, is currently relatively low, but increasing. The number being relatively low could be due to perceptions of stigma and shame (Slocombe, 2023). Some food aid organisations offer access to additional support and services such as benefit support and other advice. Additional services offered alongside food appear to be dependent on what drives the people organising the service, and there appears to be considerable variation between services. We do not know how many of these services have awareness of the specific needs of older users, or indeed which of these services offer the best benefit to PAH.

The lack of preparedness by the UK government for the pandemic, the impact on the health of the population, and the massive disruption of the whole food system were unprecedented in living memory, and this lack of preparedness put many people at risk of food insecurity, and a bad outcome (Barker & Russell, 2020). The pandemic led to the early release of part one of the *National Food Strategy*, which noted that Covid-19 has highlighted the inequities and failings of the UK food system (Dimbleby, 2020). More recently, Lang et al. (2025) stated that "the UK is generally reluctant to consider its own food security as of major political significance. This is a mistake." This report goes on:

> Food resilience preparation must take account of a variety of problems such as wide inequalities in consumption and health, poor access, cost of living effects, changed skills and expectations, and, above all, a systemic reliance on just-in-time food logistics, a nigh magical belief that food just appears on shelves. (Lang et al., 2025)

The pandemic affected everyone's food practices, particularly in relation to food acquisition. However, older people were particularly affected, and for some, this challenged their coping capacity and shifted them towards vulnerability within the food system. Despite the challenges associated with the pandemic and lack of government preparedness, and the threat of the pandemic being highlighted as a threat to the country, there is little evidence that this experience has been translated into learning and preparedness for future disruptions to the UK food supply. This means that the UK remains vulnerable, with those who are most vulnerable (including PAH) being most at risk.

4.1. Strengths and Limitations of the Study and Further Research

A strength of this QSA is that the author was involved in all four of the studies included and thus was familiar with the context of the studies and was involved in the co-production of both the data and the analysis.

Like any QSA, the analysis is limited in that the original studies and data were not designed specifically to answer the questions posed in this article. The data are not longitudinal, and each study recruited different participants, so it was only able to show how different cohorts appeared to be changing their food practices, rather than following participants over time. There is scope for further research in this area that includes different geographical contexts. Further research is also needed to explore specifically how older people are currently interacting with the food system. In particular, how changes such as online shopping and accessing community food support affect the health and well-being of PAH. Evidence is required to show how PAH who live in places which lack food support services such as MOW are managing within their local food system. Finally, studies measuring the economic cost associated with food insecurity in community-dwelling PAH are required.

5. Conclusions

A *perfect storm* of food system challenges have added to household and wider structural pressures and have adversely impacted the food practices of PAH and their interactions with food spaces and places. Although these major challenges to the food system affect all age groups, PAH have been disproportionately and adversely affected by food system challenges. Governments and food providers need to be better prepared for future major disruptions to the food system, and be particularly aware of, and prepared to support, PAH. The pandemic highlighted the value of local services that were aware of many vulnerable people in their local community and could rapidly scale up to deliver food to vulnerable households, and thus the decimation of these services across the country should be reversed.

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Conflict of Interests

The author declares no conflict of interests.

Data Availability

Data from the Dickinson et al. (2021) study can be accessed at http://reshare.ukdataservice.ac.uk/853050. For the other studies, please contact the author.

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Angela Dickinson is an experienced academic with over 25 years of experience in undertaking health and social care research with older people. She has a long-standing interest in food and food insecurity in pensioner age households and is currently undertaking work exploring the use of food aid by older adults.

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Challenges and Opportunities in Collaborative Cross-Sectoral (Healthy) Urban Food Environment Planning

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Abstract

The need to manage change in local food environments is increasingly evident in local government policies, including the demand for an integrated and "whole systems" approach. Land-use planning is often used as a mechanism to promote health—both in the creation of healthy environments and the regulation of unhealthy food environments—for example, through facilitating urban food growing and managing the location and number of unhealthy food outlets. In England, the government recently strengthened the ability of planners to promote health, including through food environments, by publishing a renewed National Planning Policy Framework. It also launched a UK-wide Food Strategy in 2025, seeking to tackle wider food system challenges. This indicates an intention by the government to strengthen food policy leadership, taking a system lens. To date, this has been predominantly led by local government and civil society action via local food policies and healthy planning programmes. Critical to the success of future action is a better understanding of the complexities and barriers to integrated work to deliver healthier food environments. This article reflects on insights gained from qualitative pre-Covid-19 research exploring three local authorities in England and their actors involved with integrated food policies and action. In-depth interviews elicit the perspectives of key stakeholders, including planners and public health officers, and shed light on some important underlying challenges. Stakeholders revealed a range of constraints affecting the ability to enact integrated policy, including conflicting framing and worldviews of food environments, challenges of ongoing organisational and leadership change, and the long timeframes needed to deliver meaningful impact. Reviewed in the light of more recent literature and policy, the insights gained reflect persistent barriers and constraints that are still of relevance today and should be addressed if implementation of integrated policy towards food environment change on the ground is to be realised.

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Keywords
determinants of health; food choices; food environments; local authority initiatives; urban food growing; urban food planning

1. Introduction

Local authorities are increasingly recognised as crucial arenas for addressing the complex socio-economic and environmental challenges associated with delivering positive food systems (Sonnino & Coulson, 2021). Concern in the Global North about the economic and human impact of diet-related ill health has spurred considerable investigation of the social, cultural, and political drivers of food choice and the intricate relationships between food environments and health outcomes (Løvhaug et al., 2022). The experience of food (its production, growing, and processing) has undergone a profound transformation in many northern cities. What was once a visceral part of urban experience is now less so, in part due to rationalisation via planning and public health interventions (Lopes & Zuleta, 2025). Instead, urban environments are increasingly characterised by restricted healthy and affordable food choices, assertive advertising, and proliferation of ultra-processed and unhealthy consumptive food environments (House of Lords, 2024). Terms such as "food deserts," "fat swamps," and "obesogenic environments" are now commonly used to conceptualise differing urban environmental exposures affecting consumer choice (Pineda et al., 2024; Saunders et al., 2015).

Despite an increased emphasis on multi-actor, cross-sector partnerships promoting urban food policy, fundamental questions persist regarding the extent to which they are effective in influencing food environments and their impact on health. Barriers persist in access to healthy, nutritious foods, evidenced in rising obesity and diet-related ill health, widening inequalities and growing food insecurity (House of Lords, 2024; Lambie-Mumford & Silvasti, 2020). Exploration of urban food environments and identification of upstream policy levers and processes—as factors influencing where and how people obtain food—are critical for bolstering both health and community resilience. Insights have been gained using multiple analytical perspectives, examining cultural, environmental, temporal, economic, and spatial factors operating at different levels. Researchers have identified complex and multi-factorial pathways influencing how and where consumer food choices are made (Lake, 2018; Story et al., 2008). Sallis et al. (2015) and Glanz et al. (2005), for example, explored "socio-ecological" models to characterise pathways to health behaviours, including food environments. Evidence of linkages between food environments and health is complex and often mixed, but also signals areas for action. For example, greater access to and consumption of unhealthy energy-dense foods, including takeaway food options, have been linked to obesity and health inequalities (Cobb et al., 2015; Pineda et al., 2024; Rogers et al., 2024). Recent literature further highlights how regulating food environments is becoming more complex due to the widening spatial boundaries of food choice, exposed by increased mobility, growth of app-based and online food ordering options, and the emergence of "dark kitchens" (Rinaldi et al., 2022).

Understanding these pathways and interconnections is important for building effective policy intervention and focusing on points of influence. Across the Global North, there is a strong consensus on the need for integrated and "whole systems" approaches; recognising ways in which elements interact is seen as critical to identifying and tackling the complex barriers and underlying drivers of unsustainable food environments

and poor health (Bagnall et al., 2019; Chang, Carhart, Lee, et al., 2025; Wopereis et al., 2024). In practice, this requires policymakers to develop positive and resilient responses rooted in a deep understanding of both the interconnected and dynamic levers of "upstream" interventions, and the pathways to coordinating action over extended periods of time. It also requires collaboration and coordination across multiple sectors and stakeholders—including planning and public health (Barry, 2022; Biesbroek & Candel, 2020; Cabannes & Marocchino, 2018; Chang, Carhart, Lee, et al., 2025). This perspective has fuelled the exploration of the role of integration in local government food policies as vehicles for food planning to influence the wider determinants of health, modify unhealthy food environments, and promote healthier food environments (Hawkes & Halliday, 2017; Ilieva, 2016; Milan Urban Food Policy Pact, 2015).

Urban land-use planning levers have increasingly been used to drive food environment change (Carmichael et al., 2019; Chang, Horrocks, et al., 2025; Chang & Radley, 2023). Examples from Europe, the US, Canada, Australia, and England illustrate how planning tools, such as food retail zoning and regulation, design codes, supplementary planning documents, and greenspace planning can all improve healthier food choices (Chang & Radley, 2023; Hassan et al., 2024; Health Equalities Group, 2025; Ilieva, 2016). This includes introducing limits to unhealthy food retail, such as "hot food takeaways," for example, incorporating guidance on density or distance from vulnerable groups, such as schools, increasingly demonstrating clear evidence of health benefits (Keeble et al., 2019, 2021, 2024; Rahilly et al., 2024; Rogers et al., 2024). Furthermore, healthy planning approaches have explored allocation of land for food growing and urban agriculture, highlighting opportunities to create multifunctional benefits to both human and planetary health (Cabannes & Marocchino, 2018; Fox-Kämper et al., 2023).

This article examines experiences of local food environment actors in strengthening policy levers in different socio-economic and political contexts and what opportunities and challenges exist in strengthening the food-health-planning nexus in England.

2. Focus on Food Environments in England

In England, those within local government, community, and civil society have increasingly pressed for stronger national policy leadership to address some of the deep-seated challenges of what many describe as a "broken" food system (Dun-Campbell et al., 2024; Food Foundation, 2025; Rostas & Briggs, 2025). A recent study estimated the annual direct and indirect cost of Britain's unhealthy food system on health and social care at £260 billion (Jackson, 2024). Others emphasise concern about the vulnerability of the food system, including exposure to climate shocks and geopolitical shifts coupled with wider linkages to planetary health (Vilar-Lluch et al., 2025; Winter et al., 2024). A recent UK-focused report calls for clear government leadership on food security, strengthened civil networks, and resilience, including advocating for greater flexibility within spatial planning to bring forward land for food growing at a local level (Lang et al., 2025).

Historically, policy guidance has favoured voluntary measures for the food industry, along with "nudges" to influence individual behaviour change and choice. A lack of decisive, strategic, and joined-up central government leadership has been identified in recent critiques, accusing policymakers of sidelining evidence and failing to address underlying challenges (Lang et al., 2025). This approach has, to date, left local governments filling the gaps, working within limited powers to drive food policy (Dun-Campbell et al., 2024; House of Lords, 2024; van Tulleken & Dimbleby, 2024). Activity at this level has seen the formation of

collaborative networks, the development of loose voluntary frameworks and metrics for action, and the publication of guidance documents. This has included guidance on healthy planning and public health, including a focus on healthy placemaking, obesity, and the determinants of health (Health Equalities Group, 2025; Public Health England [PHE], 2019; Sustainable Food Places, n.d.). In practice, progress has often tended to manifest in local, small-scale and funding-dependent projects, seen for instance in the establishment of allotments and community gardens, or local food markets, as well as improved alignment between planning and public health, including localised efforts to tackle environmental drivers of obesity (Callway et al., 2023; PHE, 2019; Schoen et al., 2020).

In 2025, the Labour Government published a National Food Strategy for the UK (Department for Environment, Food & Rural Affairs, 2025). This has been met with cautious optimism among food policy advocates for its wider food system focus. A renewed National Planning Policy Framework additionally provides more robust guidance enabling local land use planning decision-makers to consider health, including food environments (Ministry of Housing, Communities and Local Government [MHCLG], 2024, section 8 on "Promoting healthy and safe communities"). Policy guidance includes the requirement to "enable and support healthy lives, through both promoting good health and preventing ill health" (MHCLG, 2024, para. 96(c)) and to address health inequalities. The National Planning Policy Framework specifically mentions supporting access to healthier food through avenues, such as allotments and local shops, and supports local planning authorities in refusing applications for new hot food takeaways and fast-food outlets "within walking distance of schools" (MHCLG, 2024, para. 97). Similarly, proposed changes within the National Health System architecture include a focus on tackling obesity within the National Health System 10 Year Plan for England, supporting more integrated action (Department of Health and Social Care, 2025). While the ambitions embodied in these policy aspirations are appropriate, they are set against a backdrop of further major local government reorganisation of governance and geographical boundaries. Such periods of uncertainty and constant flux can seriously hamper action as existing expertise, energies, and funding streams may be dispersed or diverted.

3. Limitations of Integrated Food Policy Action at the Local Government Level

The in-depth qualitative research informing this article, carried out as part of a PhD research undertaken pre-Covid-19 (2015–2017), sought to shed light on multi-sectoral perspectives on integrated food policy-making, with a focus on food environment change through planning and land use. It was embedded within three real-world local authority contexts in England (Barry, 2022). Academic and policy literature at the time was beginning to build insight into how food can be integrated into the urban fabric through planning. Whilst much of the focus was on aspiration and sharing knowledge about on-the-ground interventions, a gap remained in understanding underlying policy-making processes, supporting conditions, multi-sectoral perspectives, and motivations that take place behind the scenes. The study set out to build an understanding of how aspiration translates into application, and how interpretations of integrated food policy aims are realised on the ground by identifying both integrating and disintegrating factors at play. Literature from across public health and food planning at the time pointed to a lack of understanding about the nuances of integration in the food policy process, weak central government leadership, limited support for regulation, and continued dominance of the influence of commercial factors (Roberto et al., 2015). Food governance was often unclear, leaving local governments and civil society to fill the "policy vacuum" (Cabannes & Marocchino, 2018; Hawkes & Halliday, 2017; Sonnino et al., 2019). Limitations and

complexities of integrated food policy work at the local government level pointed to silo working, gaps in understanding and skills for systems approaches, political and commercial pressures, constant change, and short-term thinking—all acting to hinder progress (Chang, 2017; Santo & Moragues-Faus, 2019; Sautkina et al., 2014).

Studies published after that research continue to identify fragmented or inflexible policy governance, where intentions to integrate and prioritise food within policy agendas, despite intent, are still not realised (Duvernoy et al., 2025; Summerhayes & Baker, 2024; Zerbian et al., 2024). Others have examined more specifically the work of planners and public health professionals to implement food environment change. For example, Chang, Carhart, Cook, et al. (2025) highlight the impact of continued instability and uncertainty affecting policymakers' ability to embed action on health, in part due to constant planning reforms in England, reduced resourcing, gaps in skills, and a lack of shared understanding between public health and planning professionals. Coombes et al. (2025), examining the role of healthy places officers in embedding health in local government structures, found that this type of role might be useful in supporting a move towards improved intersectoral working and development of broad health-focused plans, which may have relevance to the food agenda. However, they identified the need for both strategic commitment and formalised structures in place to enable this to become sustainable. Chang and Hobbs (2025), in a health census of local plans in England, provide a baseline for the state of local planning. They map geographical, political, greenspace, and other factors, such as hot food takeaways, against evidence of integration of health into local plans, exploring to what extent health policies are informed by health and deprivation indicators of local areas. Although the study found inconsistent patterns of integrating health into local plans based on health and deprivation data, it provided some initial evidence of this in some areas. Those local authorities in seriously deprived urban areas were more likely to have a health objective policy; those also with a Labour (i.e., centre-left leaning voting) majority were found to be more likely to have a health-specific hot food takeaway policy. Chang and Hobbs (2025) suggest further census work to explore these factors in more depth and to help guide action at the local level.

The following section explains the study's methodology and then presents and analyses views from different actors in the study towards trying to realise laudable policy goals before Covid-19. The article then briefly discusses the findings and ends by reflecting on these challenges in the light of recent research and policy development, to highlight possible ways to bridge the implementation gap towards transformative food environment change.

4. Methodology

The research examines pre-Covid-19 insights on integrated food policy around food environment change through urban planning and land use within three urban local authority areas in the English midlands. It draws on narratives collected between 2015 and 2017, based on in-depth interviews with urban planners, public health officers, and food policy leads (Barry, 2022). The case studies were selected on the basis that they would enable exploration of how local government policymakers aspired to galvanise integrated food policy across public health, including via the use of different planning instruments, specifically to facilitate food environment transformation. Pathways towards this included the use of food and healthy planning policies, planning tools, regulations to restrict unhealthy food outlets, and the use of healthy planning principles, for example, in the allocation of land and green infrastructure for food growing and urban agriculture, and development or master planning for regeneration with reference to food. The three chosen case study areas were linked through being

located within the same wider metropolitan area, but demonstrated varied local political, social, and economic contextual factors, with key features described at the time of research, summarised in Table 1.

Table 1. Contextual factors for the three case study areas.

Contextual factors	Case 1	Case 2	Case 3
Population (Office for National Statistics, 2011)	314,000	308,000	206,000
Life expectancy at birth (years; PHE, 2021)	77 male 81 female	79 male 83 female	80 male 84 female
Density, fast food outlets/100,000 population (PHE, 2018)	118/100,000	97/100,000	70/100,000
Deprivation ranking based on average score (Department of Communities and Local Government, 2015)	13 (with uniform spread of deprivation)	110 (deprivation in key wards)	178 (with deprivation concentrated in 3 wards)
Political factors at the time of research (Barry, 2022)	Labour majority and post-industrial low-growth economy	Conservative (narrow margin) and post-industrial low-growth economy	Conservative (no overall control) and strategic drive and focus on economic development
Food policy focus, common features, and drivers	Strong public health leadership as a pioneer of food policy since the 1990s, driven by strategic concern on determinants of health, health inequalities, and deprivation Strategic support to develop urban agriculture Commitment to healthy planning and development of systems approaches Use of planning tools to restrict unhealthy food outlets, e.g., supplementary planning document	Strategic policy focus on healthy urban planning Successful healthy town bid, which gave a grounded opportunity to embed approaches to tackle the obesogenic environment Food policy enacted via healthy planning and an obesity focus Use of health and planning policy to restrict hot food outlets as part of a wider health focus in the local development plan	Public health-focused, which post-2010 was extended to exploring food policy Food policy document published in 2015 Main focus on obesity, "whole systems" and sustainability lens, including reference to the use of planning tools Explored the use of supplementary planning tools to restrict hot food outlets, but did not proceed due to the use of commercial and other pressures
Interviewees by sector:			
Public health	6	3	4
Planning	6	4	3
Greenspace/environment	3	4	5
Other (civil society, urban agriculture, etc.)	6	3	4

The study sought to explore real-time multi-sectoral policy perspectives on integrated food policy-making and governance around (healthy) food environments, through urban planning and land use. It drew on documentation, policy sources, and in-depth interviews to provide insight into varying frameworks used when developing integrated and systemic strategies. The approach focused on exploring the contextual factors, and the "how" and "who" rather than the "what" of the policy process by drawing on frameworks and concepts from policy analysis and systems thinking, whilst recognising value of a grounded and flexible approach to research design in the light of the complexity of the topic (Greenhalgh & Papoutsi, 2018).

Fifty-one interviews were conducted with spatial planners (planning policy and development officers), public health officials (directors, food policy leads, and healthy planning officers), civil society, and various other professionals involved in shaping the greenspace and built environment. Interviewees were identified using a "snowballing" approach, starting from key informants involved in the local government food policy process, and leading to introductions to others across the system. Included were those who were identified as actively involved in the pathways towards policy implementation, working in or with local government. Ethical approval and informed consent were gained following guidance set out within university policy. Interviews were transcribed verbatim. Analysis of the data, including interview transcripts, along with related documentary and policy evidence, was undertaken using well-established methods common to qualitative research to develop themes, drawing on the frameworks of Huberman and Miles (2002) and Ritchie and Spencer (1994). It involved an inductive and iterative process, visiting and revisiting the data to develop, check, and redevelop themes, in a series of steps, along with consultation and discussion in the research team.

Overarching themes identified focused on the nuances behind the policy-making process within the local authority settings, exploring pathways to food environment change (Figure 1). Themes identified were grouped into integrating and disintegrating factors, which support or hinder development towards

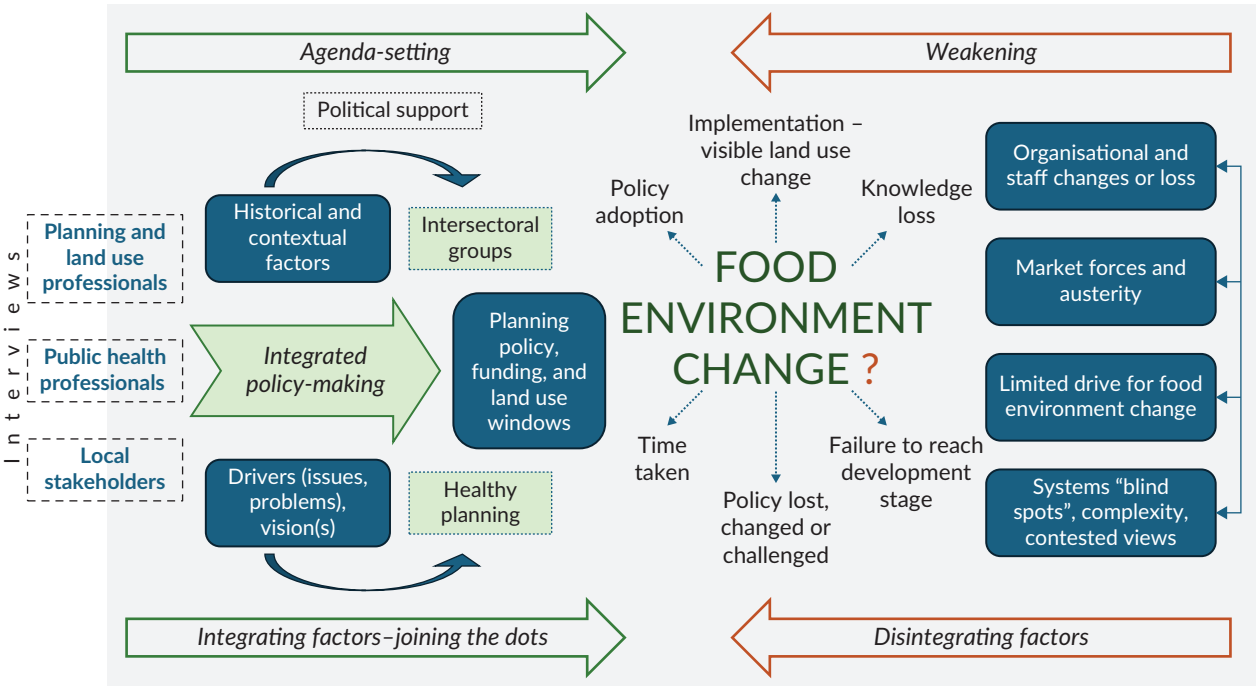

Figure 1. Themes indicating integrating and disintegrating factors in achieving food environment change.

integrated systems-based approaches and food environment action through urban planning and land use. In this article, we highlight some of the narratives between planners and public health officers, specifically their views on understanding the place of food, and ways in which integrated approaches were supported or constrained.

5. Analysis of Results

The planners and public health officers interviewed drew on decades of involvement in food policy development and integrated approaches towards food environment change. This section contains many direct quotes to convey the specific viewpoints and contexts. Overall, the research identified supportive, integrating factors underlying progress, including the role of key individuals and champions, healthy planning approaches, along with exposing inherent fragility. Disintegrating factors and barriers included different professional and personal viewpoints, a lack of real-world understanding of systems approaches, silo working, and challenges of balancing long-term consistency against ongoing change and external commercial and fiscal pressures.

5.1. Varied Understanding and Concepts of Food and the Role of Food Environment Change

Developing integrated policy and identifying complex levers for food environment change rests on building a shared understanding of food and its role in society, and of motivations for change from the start. Contested viewpoints about the justification, meaning, and place of upstream action on food were noted both within and beyond food policy groups, reflecting varied attitudes and understanding, including individual and structural approaches. Interviews with planners, public health professionals, and officers involved in food policy highlighted the critical need for dedicated time to build shared understanding. Officers' perspectives and engagement in the policy process varied, influenced by a spectrum of framings and attitudes to food-related issues, often reflecting highly personalised approaches:

> Food…it's quite emotive, people get very personal about it. (Food Policy Officer, Case 1)

> I think food, within public health and weight management and healthy eating, and within UK culture, is probably the hardest paradigm to crack…individually it goes both ways in terms of malnutrition and overeating…it is very emotional at an individual and societal level. (Public Health Officer, Case 3)

These individual framings affected some stakeholders' ability to grasp the complex interconnections in the food system. The delicate web of relationships was not always widely understood and often viewed through narrow and potentially restrictive professional silos and personal viewpoints. Consequently, some participants with a broader understanding recognised some societal ignorance of likely critical issues and hence signalled reluctance to overtly reveal their motivations for food environment change within food policy discussions:

> The big challenge…is going to be market volatility and food prices, and I don't think people have realised that is about to happen around the corner, from a global perspective. Having local fresh food supply chains, in case of severe climate change, and in case of warfare…things like that are not considered. (Planner, Case 1)

Some interviewees recognised the necessity of flexibility in articulating broad concepts of food, to gain buy-in, and using opportunities to adapt their messages as needed in order to speak to diverse and multi-functional agendas. Here, for example, one interviewee spoke of the need to highlight relevance across different arenas, thus avoiding "pigeonholing" food:

> We can't afford to get to "public healthy" around this [because of individual and societal resistance to some messages explicitly targeted at public health]…if we pigeonhole things too narrowly around food, physical activity, they remain stuck. We need to change our language a bit…so then we can move these things on. (Public Health Officer, Case 3)

5.2. Planners and Public Health Viewpoints and Constraints to Integrated Work

Beyond shared understanding, developing an integrated approach towards developing and implementing practical food environment pathways required strong relationship-building between planners and public health officers. This involved negotiating expectations and constraints, often taking into account their differing remits and professional worldviews. While some planners revealed a strong understanding of interconnections between food and the built environment, this understanding was not universal—some hardly considered food in their practice.

Whilst learning and exploring, mutual benefits occurred to some extent within food policy groups, but they were sometimes limited and abstract. Better adoption and integration were achieved through opportunities to work towards practical and shared endeavours, presented through healthy planning practice and within specific development projects. For example, a healthy planning lens was seen to support broader exploration of the place of food environments in real time. Opportunities emerged which supported the forming of spatial understandings of food, greater buy-in and development of skills towards systems approaches, and mutual benefits, through seeking to position food (for example, food growing or healthier retail) within land-use plans, collaborating on funded urban regeneration projects, design codes, or opportunities presented in drawing up formal development policy and strategies. A planning professional in Case 1, for example, described working together with public health professionals to develop master plans within land allocated for new housing development, as follows:

> Closer relationship with public health has been a driving factor for us in changing our thinking, and the officers…have tried to…change the way the other people think within the office….Public health and planning should go hand in hand, we should be discussing how we create environments for healthy living, and the food focus…looking at developments. (Planner, Case 1)

In Case 3, opportunities for embedding food within emerging local plans were explored, along with turning some space into a community garden as part of a housing regeneration scheme through the identification of mutual benefits within the cross-sector food policy team:

> This particular site was a bit of space left over…the houses had been built around it, there were houses that had not been developed because the money had run out, space had been left…used for drug dealing and littering…so that was a site we identified something needed doing. (Public Health Officer, Case 3)

Case 2 similarly provided an opportunity to learn and work collaboratively on a "tactile" programme with action on obesogenic environments as a result of a successful bid under the Healthy Towns Programme. This was foundational in building understanding and trust for subsequent work together on a local development plan (see Sautkina et al., 2014):

> We presented it to planning…they all jumped on the thing that will give them a tactile programme to showcase how influential planning is on health, so theory and policy is all very well, but seeing programmes and products emerging…we co-authored it, hit it off really well, could see how we could scratch each other's backs and there was genuine honest collaboration. (Public Health Officer, Case 2)

However, despite their aspirations, both public health professionals and planners often spoke of tensions emerging from their differing expectations and framings, which could counteract this effort. This exposed the inherent limits and realities of formal planning processes when attempting to address complex health issues, particularly the narrower parameters within which spatial planning operates:

> [The public health officer] would probably say they were in that camp thinking planning was the great panacea…to…stop hot food takeaways springing up….I have to take them carefully through that whole conversation: "Well, you need to be able to demonstrate planning harm, yes, there is obesity, but how do you relate that directly to this development?" (Planner, Case 3)

In each of the case study areas, planning officers—perhaps reflecting the myriad of policy pressures and delivery expectations, or perceived lower priority of healthy planning—expressed concern about the extra burden of work driven by expectations of public health or voiced that they were doing it anyway.

> There's resistance to new things from planners, "oh no, something else we have to think about…not just flooding, air quality and transport…now they want us to worry about how many people have asthma or obesity" (Planner, Case 3).

Health was consistently viewed as just one of the many competing factors within planning decision-making, revealing limitations of planning as a tool for driving food environment change:

> The council has aspirations in terms of delivering healthy communities, I fully get that, but quite often what I see as a planner is "oh the planning system is a vehicle to deliver this, that, and the other," and it's a very blunt planning tool, [but] people think it has the power to control x, y, and z. (Planner, Case 3)

The recently revised National Planning Policy Framework (MHCLG, 2024) significantly strengthens planners' capacity to restrict unhealthy food environments and champion healthier alternatives. However, its practical translation into tangible action is yet to be demonstrated. Although local authority public health departments—responsible for promoting population-level health—are increasingly collaborating with others, including planners, to identify and address the wider determinants of health, they lack status as statutory consultees within the formal planning process. This absence of a mandatory requirement (UK Government, 2019) may continue to act as a limiting factor, again placing reliance on relationship building, as one planner's comment reveals:

> In our consultation process, we have a lot of statutory consultees, but I don't think public health is (statutory)…it's kind of left to the officers…to remember, "oh yeah, we should consult public health." (Planner, Case 1)

Decision-making within planning, in the context of influencing food environment levers, remains nuanced and far from an "exact science," instead being subject to locally differing interpretations. This could be frustrating for public health efforts; for example, when trying to implement supplementary planning documents that aim to limit new hot food takeaways:

> I know public health were keen to get 400m buffer zones around primary schools…but it's just not practical, because we would literally obliterate the whole borough, and that's not what planning is about. (Planner, Case 1)

Some of the narratives indicated systems' "blind spots" and disconnections, which acted as a weakening and disintegrating force, even when policy aspiration was clearly aligned, supported, and in place across councils towards food environment change. Planners, public health, and other actors all revealed to some extent a lack of reach, understanding, ownership, or ability to "see" where the responsibility lay and who/what were the real drivers of food environment change.

5.3. Balancing Commercial and Other Implications With Wider Determinants

Underpinning the conceptual and practical differences between planners and public health were significant considerations: the broader determinants of health, along with very real commercial, economic, and land-use pressures. While the aspiration towards healthy planning was welcomed, budgetary constraints and land development pressures brought "reality" into the decision-making process. These pressures are still evident in 2025, and government policy continues to prioritise both financial constraint and drive for economic growth.

Although local authorities and different stakeholders can draw on government strategies and planning policies to limit unhealthy food environments and encourage positive food environment change, demonstrating causal evidence at a local level can be tricky (Keeble et al., 2024). For example, one case in this study tracked the hard work over many years to build integrated policy leverage in a local plan, including collating robust international, national, and academic evidence to support implementation of buffer zones around schools to restrict hot food. However, the levers to introduce these buffer zones were ultimately weakened when the planning inspector challenged the proposed policy in the local plan, questioning the transferability of that wider evidence to the specific local context. Inconsistency of understanding and decisions by planning inspectors—who examine local plans in England for approval—may continue as a constraint undermining moves towards more robust action (see Chang, Horrocks, et al., 2025):

> There have been various studies carried out on health benefits attributed to good development….I think the wider determinants are difficult to put a figure on….How many lives have you saved? What gap have you closed in healthy life expectancy? (Public Health Officer, Case 1)

> It's been completely turned on its head from the inspector's point of view, so that it is virtually non-existent….We're not really in a position now where we've got a strong policy that allows us to

> carry these ideas forward. So we are back in the position now where it [the food environment policy] is supplementary, and therefore it can be appealed. (Planner, Case 2)

Subsequent work highlighted that the difficulties of implementing regulation can lead to reticence and inconsistent approaches from planning inspectors in decision-making on appeals against the refusal of planning permission (O'Malley et al., 2023). Furthermore, the threat of judicial challenges from well-resourced commercial developers and food retailers has also affected the willingness of some local authority planners to use this pathway (Chang, Horrocks, et al., 2025). Commercial and housing pressures continue as key considerations for local authorities, particularly in more deprived areas with constrained ability to generate income, following decades of austerity and funding constraints (Local Government Association, 2024). Such persistent pressures on local authority budgets continue to drive hesitancy, put strain on amenities, services, and green spaces, and contribute to a lack of willingness to face the costs of appeals by food retailers (Chang, Carhart, Cook, et al., 2025; Whitten, 2019):

> We have local evidence, but I think ultimately people are not in a position to use that as a tool against developers. If you have a strong developer who wants to open a burger bar, they know their stuff, their case law inside out, so they'll bat it back….We've been bitten and…very cautious about being bitten again. (Public Health Officer, Case 3)

While emerging health and public policy in 2025 focuses on pooled budgetary decision-making and a focus on the wider determinants of health, the hard reality of continued budget cuts often generates shorter-term thinking and the pressing need to generate capital. This, in turn, exerts pressure to retreat further into silos and away from integrative systems-based approaches. This pressure was tangibly reflected in the case study areas with strong growth-focused policies. This was revealed in the reluctance to impose restrictions on hot food outlets due to the concern about the impact on high streets, alongside some planners' unwillingness to take what they perceived as a "moral stance" or interference with the free market:

> People talk about "well we're looking for economic growth, so we don't want to stop developers coming in, so if it's to open up a fish and chip shop, then so be it," at least it's better than an empty shop in that respect….Public health argument would be, "but what about the cost and the public health issues?" The answer would be "that doesn't matter because it's the National Health System budget." (Public Health Officer, Case 1)

> Until we have shared budgets, people aren't going to be thinking of the systems. (Public Health Officer, Case 3)

The concept of "developer viability" emerged in interviews, underscoring local authorities' limited bargaining power and scope for creativity against developers and house-building pressures. Without robust government guidance (for example, on the mandatory incorporation of green space within developments), this is unlikely to change. While the provision of allotments or food growing sites was a popular aspiration in local planning and food policy, the reality is that flexibility for dynamic thinking is curtailed by the need to ensure on-site viability:

> We have enough issues in trying to make development viable, so adding food production into the mix puts pressure on viability. Whilst I think it's relatively cheap and easy to do this, this isn't the case from [the perspective of] developers. (Planner, Case 1)

Although local authorities are well placed to initiate sustainable agendas through engagement with market actors and other key stakeholders, developers are likely to see food growing spaces as a low priority. Consequently, its implementation remains largely dependent on the initiative of the local community and grassroots groups:

> [A] developer is only going to deliver a nice allotment site if you know they've got enough value out of the rest of it; if they are going to put something in that is nil value, that's always the trade-off. (Planner, Case 1)

One planner expressed frustration with the protracted timeframe—over 15 years—in trying to secure land for a food growing site within bold new development plans. The interviewee recalled how the initial ambition to deliver a communal growing area was effectively lost because of commercial pressures, shifting policies, and loss of knowledge and carrying capacity, following the departure of key staff and individual champions:

> One of the very early iterations [of this development] had a kitchen garden, a communal food growing area, to utilise a bit of land that was harder to develop and had less value, but by the time you have worked through all the constraints of the site, and you had to get a certain number of houses onto it to make it viable, that had disappeared. (Planner, Case 2)

The impact of time taken for development planning and approval processes, as well as loss of staff and knowledge, was also highlighted in other instances:

> All these things…they do take an extraordinary amount of time to develop, and therefore…if you leave it more than two years, you find different people, so with aspects of food development, it's difficult to say it made much difference at all, really. (Public Health Officer, Case 1)

5.4. Time, Change, and the Role of Key Points of Consistency

In each case study, whilst written local policies and key advocates clearly aspired change towards integrated food environments through planning and land use decisions, the ability to embed longer-term impact remained fragile. The frequent and often rapid changes within local and national government policy environments, along with constant restructures (and associated losses of key personnel), must be juxtaposed against the longer time frames needed to implement and embed action through land and environment practice. This is, for example, evident in the time taken (sometimes over a decade as described for Case 2 in section 5.3) to bring forward development land for food growing or to prepare robust development policies.

As a result, ambitious programmes, envisaged by public health or within healthy planning frameworks, often prove fragile and prone to disappear once those in key leadership or influencing roles have moved on. This again raises the critical question about the fragility of creating positive land-use change and the ability to see through long-term disruption of dominant food environments (and, indeed, the wider systemic link to health and biodiversity). It strongly indicates the vulnerability of integrated and systems-based approaches and how such progress may continue to depend on key individuals and is highly contingent on contextual factors:

> It's like constellations of stars that brighten up the firmament and then disappear. (Food Policy Officer, Case 1)

The drive of key visionary individuals, as well as "constellations" of individuals acting as advocates or key actors with leverage at pivotal points across a system, was seen as essential to bring about change. This requires consistency, advocacy, commitment, communication, and knowledge transfer across long time frames:

> It helped that our previous assistant [planning] director was an environmental health officer, from a public health background, and it was a virtual sackable offence not to consider public health in what we did, so that helped us, because our structure reinforced the linkage. (Planner, Case 2)

> Some of the positions they occupied were pretty lowly; they weren't all chief execs at the time, but they were in a position to make change happen. (Food Policy Officer, Case 1)

Opportunity and timing emerged as critical contextual factors, either supporting or hindering food policy development and subsequent action. One officer, instrumental in driving food policy efforts, highlighted this reliance on several key actors who possessed both the ability to operate across the system and, crucially, were positioned in the "right place, at the right time" and able to access resources to drive change:

> You get constellations of people in places at particular times who are able to actualise disruptive thinking—people who are prepared to take risks and think…or do the unimaginable….There is an idea that progress happens because someone has a bright idea—but often it doesn't work like that, and…the urban agriculture was a constellation of people, structures, and funding streams, eventually made all of that…possible—of course, that has all changed. (Food Policy Officer, Case 1)

The inevitable and ongoing change to and fragmentation of political structures and leadership—which we still see happening today—exposes the fragility of food policy work and the speed at which once established approaches and programmes can break up as key "constellations" are dismantled. Finding ways to maintain, protect, and transfer knowledge and action across time is important to address, especially recognising the unique combination of facilitating factors and the time taken to align leadership, policy, and practical land use factors on the ground:

> Changes of political regime drive social change, not just about the money, it's about the people…those constellations of people where you get a break-up and scattering of people, ideas, and vision that come with them; and then you get the new people, they don't get it, and it's not important to them. (Food Policy Officer, Case 1)

Embedded knowledge, particularly visible in physical manifestations of changed food environments and change seen in the tangible fabric of people's lives, such as community gardens, was seen as one way of providing a form of pedagogical learning. This was seen as a way to build resilience and to transcend the ever-changing and often ephemeral landscape of governance, policies, structures, and projects. It was believed that embedded environmental change could act to demonstrate the legacy of policy intent and signify the outcome of integrated work that could endure and survive during times of change:

> For people in civil society to truly see and know that, not by saying, "we have this policy, these programmes" but to be able to see images in their everyday life, in their education, their work, their estate…in the end it comes back to simple affirmations of all these images in their everyday life. (Food Policy Officer, Case 1)

6. Discussion

The collected primary data has limitations in that empirical work was completed pre-Covid-19, in addition to publication of further research and policy changes since its completion in 2022, as outlined in the previous sections. Whilst acknowledging such changes, we have also observed through our subsequent applied and academic work that the value and relevance of the insights gained from that in-depth research, as presented in this article, are still relevant. They reflect persistent factors that continue to challenge attempts to embed integrated action on food environment change. Current professional practice and observation indicate that many of the fundamental issues remain pertinent, and we highlight those insights to better understand the connections between and implementation of policy, research, and practice in urban greening, social-ecological systems thinking, and urban transformative processes. The lead author, based within a regional health-focused NGO, has witnessed the tensions between the political rhetoric and action. For example, the previous Conservative government's policy narrative around "levelling up" communities, as well as that of the current Labour government around economic growth and renewal, are set against a backdrop of a rising cost of living, deteriorating health indicators, and increasing food poverty. In our view, this signals that the contextual factors have not fundamentally changed, and possibly worsened, despite the recent increase in policy-making around healthy places and communities.

The interview findings resonate strongly with the broader academic and policy context described in the introduction and literature review. The research reinforces that local government is a crucial arena for addressing food systems challenges, but its effectiveness is highly contingent on a complex interplay of integrating and disintegrating factors. Insights gained from the three local authority case studies pre-Covid-19 can now be enhanced, considering subsequent research by Chang and Hobbs (2025) on locational, political, determinants of health, and other factors, and the likelihood of adoption of health-related planning policies. For example, in Case 1—a post-industrial urban unitary authority, with a strong Labour majority, stark inequalities in health, and poor food environments, including a high density of hot food takeaways—there was strong and early leadership and development of health-related food policy planning driven by analysis of interconnected systems and wider determinants. This contrasted with Case 3, characterised by a fragile political balance, and strong drive towards economic growth, and less uniform or deep-seated deprivation indices. Here, food policy and healthy planning emerged later, as part of wider policy encouragement.

Although planning tools are increasingly accepted by local authorities and different stakeholders as common practice for limiting unhealthy food and encouraging food environment change, challenges persist in effectively implementing them and demonstrating causal evidence at a local level (Keeble et al., 2024). Evidence on the impact of wider determinants on health, including unhealthy food environments, may still be seen as lacking local relevance and robustness within current planning frameworks (Carmichael et al., 2019; Chang, Horrocks, et al., 2025). Thus, the issue of inconsistencies and different understandings of what is regarded as strong, acceptable evidence, or how convincing data can be collected or calculated, and differences in interpretations of national guidance are all persisting issues. Similarly, economic shocks, viability concerns of private developers, vested interests by large food production companies, emphasis on economic growth, extensive austerity periods and measures continue to influence today's decisions and developments and tend to negatively influence the complex interplay of factors affecting physical and mental health, long-term social-ecological wellbeing and fostering resilient processes and systems (House of Lords, 2024; Sievert et al., 2025).

The interviews highlight the need for integrated and "whole systems" approaches and coordination across multiple sectors and stakeholders, including planning and public health. The supportive, integrating factors identified in the interviews—the role of champions and healthy planning strategies—directly align with the literature that champions multi-actor partnerships and the use of planning tools to drive food environment change (Cabannes & Marocchino, 2018; Hawkes & Halliday, 2017). Planners and other food environment actors in Case Study 1, for example, recognised the synergistic effects of food growing, food intake, and healthy living, and an opportunity for a garden city type approach to their spatial plan and design framework to inform redesigning the area.

A more modern take on garden city-inspired planning could involve space for more food produced locally by individuals and communities in the form of private or community gardens and other urban agriculture projects or small business ventures, for example. This could also tie in with the implementation of recent environmental legislation (the Environment Act 2021), which requires developments in England to have a biodiversity net gain of at least 10%. The potential high biodiversity (in addition to mental and physical health and dietary benefits) of small fruit and vegetable growing ventures is often overlooked in planning discourses and negotiations. Unlike in our cited Case 2, where a kitchen garden and community growing area were lost due to value engineering; now with the duty of biodiversity net gain and adherence to the mitigation hierarchy (where benefits should take place on site rather than being offset), net-zero strategies (carbon savings through lower/no food miles) and climate change adaptation pressures (permeable surfaces, shade, pollinator habitats, etc.), urban agriculture provisions may have a fairer chance of becoming valued assets.

The findings also illuminate the significant barriers that hinder this progress. The disintegrating factors, such as differing professional viewpoints and silo working, reflect the fragmented or inflexible policy governance highlighted in the literature (Duvernoy et al., 2025). The documented struggle to build a shared understanding of food's role and the feeling among planners that health is an "extra burden" aligns with recent studies that point to continuing gaps in skills and a lack of shared understanding between public health and planners (Chang, Carhart, Cook, et al., 2025).

The lack of or difficulties with integrating food policies with food systems and achieving cross-realm governance to advance urban sustainability have recently also been studied by Summerhayes and Baker (2024) in Australia (specifically Queensland, Western Australia, and Victoria), proposing a framework for food policy integration to improve food-related urban planning, highlighting social and environmental (resilience) benefits yet also challenges relating to economic hegemonies. Similarly, the interviews in our case studies provide a human-centred perspective on the structural and financial pressures identified in Section 1. The reluctance to face costly appeals from well-resourced developers vividly illustrates the realities of formal planning processes and the political pressures and short-term thinking that impede change (Chang, 2017). This tension is particularly relevant in the context of recent policy changes, such as the revised National Planning Policy Framework, which aims to empower planners but still operates within a system subject to economic pressures and inconsistent interpretations by planning inspectors. The findings suggest that while the new policy provides leverage, the on-the-ground implementation remains fragile and vulnerable to these systemic pressures.

7. Conclusion

Navigating the complex landscape of food policy and healthy urban planning, even before the Covid-19 pandemic, highlighted a gap between intention and action. Narratives from that time reveal several enduring challenges that continue to affect efforts to create healthier food environments today. These include a reliance on voluntary measures, an absence of consistent, long-term leadership, and the restricted power of public health in planning decision-making.

A fundamental issue surrounds the divide between laudable high-level policy goals and their implementation on the ground. Despite a growing focus on integrated, whole systems approaches to food policy, many of the same barriers as highlighted in the interview findings persist today. As this study reveals, this is especially pronounced at the local level, where competing interests—from commercial pressures to short-term fiscal realities and siloed budgets—can undercut long-term policy ambitions.

Newer research and policy discussions have explored these issues further, emphasising the need to move beyond simple policy announcements and address the primary causes of these challenges. One promising avenue is the use of "healthy public" policies and food systems approaches within local government. These frameworks can help embed food considerations more deeply into broader policy conversations, encouraging wider and stronger ownership of the issue(s) across different departments.

In the future, the effectiveness of new initiatives, such as the UK's Food Strategy and updated planning guidance, will depend on their ability to create genuine, enforceable levers for change. Developing effective (integrated and cross-sectoral) governance frameworks is key. These should be realistic and resilient enough to withstand constant organisational shifts and leadership changes. This is important for maintaining knowledge and continuity over time, which in turn facilitates a systematic approach to enhancing food environments.

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Conflict of Interests

The lead author was employed by a charity in one of the case study local authorities as an urban agriculture development worker active in local food policy between 1999–2015. The PhD research and primary data collected informing this article occurred after this time. The authors declare no additional conflict of interests.

Data Availability

Additional data relating to the PhD research can be found in Barry (2022).

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ARTICLE

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Measuring Food Supply Through Closeness and Betweenness: Halls and Open-Air Markets in Metropolitan Barcelona

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Abstract

This article presents an approach to food procurement systems employing the concepts of closeness and betweenness. The objective is to define tools for measuring proximity related to food supply within dense urban contexts, where procurement is guaranteed but is still an essentiality that affects the quality of life of residents. This is due to the structured network that supports everyday movements, where food providers function as catalysts for the establishment of proximity routes. The research focuses on Barcelona's metropolitan area, employing a quantitative methodology associated with mapping systems to study the spatial distribution of publicly managed halls and weekly open-air markets, as well as the proximity service they offer in terms of relative distances and times. The results obtained demonstrate a novel approach to analyzing a territory based on its public food supply, transferable to other geographies. In contrast, a precise diagnosis of the metropolitan fabric studied is provided, highlighting vulnerabilities in the system and establishing a foundation for proposing new urban planning and design actions to address food supply.

Keywords

Barcelona; food systems; market halls; open-air markets; proximity

1. Introduction

The average European household allocates 13.0% of its budget to food purchases, making it the second-largest expenditure category after housing (23.7%) and just ahead of transport (12.8%; Eurostat, 2024). Moreover, the hospitality sector, encompassing both restaurants and lodging, accounted for 9.1% of the aggregate figure,

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thereby positioning it as the fourth-largest spending category per household. However, while the disciplines of urban design and planning address issues concerning how citizens live or move, the question of how people eat is not generally accorded a place among the priorities in the design of the metropolis. The American Planning Association prompted studies on food supply systems when Pothukuchi and Kaufman (2000) raised a similar concern, pointing out that among the basic elements of life—air, water, shelter, and food—planners had traditionally addressed them all except for food (Morgan, 2009).

Food supply, as well as consumer amenities, are both shaped by and contribute to the dynamics of economic geography (Sonnenschein et al., 2022). Furthermore, territorial interactions play a critical role in shaping food supply systems, as they influence the spatial configuration of production and distribution networks, the relational proximity between actors, and the governance mechanisms that support localized food practices (Felici & Mazzocchi, 2022; Horvath et al., 2024; Pascual & Guerra, 2024; Recine et al., 2021). Within this framework, and at the urban scale, planning and design contribute to shaping the spatial distribution of suppliers and the accessibility of these locations for consumers (Kesarovski & Hernández-Palacio, 2022). In contexts where food security is guaranteed—understood in terms of the accepted definition, when "all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (Food and Agriculture Organization, 1996)—the relationship between urban form and food suppliers is often two-fold. On the one hand, dense and compact environments facilitate walkable access to essential services, which has been demonstrated to lead to the creation of more inclusive spaces (Marquet & Miralles-Guasch, 2015). Moreover, the decline in automobile usage, along with reduced emissions, fosters walkability, a phenomenon shown to promote improved health and well-being across diverse social groups and over time (Carmona, 2018; Valls & Clua, 2023). In contrast, in expansive suburban areas, inadequate public transportation leads to a reliance on private vehicles, limiting access to food and daily activities for those without them—particularly the elderly and low-income groups (Bose, 2024; Dumas et al., 2021). This phenomenon unveils profound structural inequalities.

The movement restrictions imposed during the Covid-19 pandemic highlighted the importance of effectively distributing essential urban amenities (Boz et al., 2024; Faedda et al., 2022; Jabareen & Eizenberg, 2021). Accordingly, promoting healthy habits in daily activities—such as food procurement—is hypothesized to support urban sustainability (Barton & Grant, 2006; Kaaronen & Strelkovskii, 2020; Rydin et al., 2012; Siri, 2016). This involves encouraging short trips, ideally on foot, by bicycle, or via public transport.

Escalating economic, welfare, and technological advancements have triggered an increase in inequality regarding food environments (Thompson & Smith, 2025). On the one hand, there is a shift towards lifestyles that rely on food delivery through digital platforms and the revival of urban theories advocating for "kitchenless" households (Puigjaner, 2015). On the other hand, rising food insecurity has led to the expansion of food-related charities and food banks (Esmaeilidouki et al., 2023; Gracia-Arnaiz et al., 2021). Nevertheless, access to fresh food is still recognized as a key indicator of well-being and quality of life among urban residents. Numerous studies have established a direct link between the availability of healthy food options and various health outcomes (Pechey et al., 2022). Evidence associates food availability with dietary behaviors and health outcomes in urban settings of low- and middle-income environments (Turner et al., 2020). Contrarily, limited access to healthy foods in urban food deserts correlates with poorer diet quality and higher body mass index among residents (Dubowitz et al., 2015). Furthermore, urban

populations with restricted access to healthy food, particularly low-income and minority groups, experience higher rates of obesity and food insecurity (Freedman & Bell, 2009).

In this context, it is pertinent to question whether it is viable to seek and promote proximity in the food procurement system. Proximity is understood here not as the origin of the goods offered by the food system, but rather as the frequency and distance that citizens travel to obtain them. The present research puts forward a series of propositions to investigate the relationship between providers and households in terms of rhythms. In order to achieve this objective, closeness and betweenness centrality—concepts associated with urban network analysis—are used for analysis. Understanding these centrality measures enables urban planners and designers to make informed decisions aimed at improving accessibility and flow within urban environments (Fushimi et al., 2020; Shi et al., 2024). Closeness centrality assesses how near a location is to all others in a network, highlighting areas with high accessibility. This measure is instrumental in identifying zones that facilitate efficient access to services and amenities, thereby promoting urban vibrancy and sustainability (Z. Chen & Huang, 2024). Conversely, betweenness centrality identifies nodes that frequently occur on the shortest paths between other nodes, indicating their role as critical connectors or potential bottlenecks within the urban fabric. High betweenness values can reveal areas susceptible to congestion but also opportunities for strategic interventions to enhance connectivity and resilience (Curado et al., 2020).

The following pages propose an approach to measuring closeness and betweenness in the food system, focusing on two defining features of metropolitan Barcelona: the strength of its public dimension and the widespread presence of this public dimension in the territory. Section 2 of the article introduces the geography of the metropolis and the explanation of the elements that make up the food system, to expose the specificity of the main object of this research, a structural part of the constellation of providers: the market halls—publicly owned facility buildings that house privately owned stalls and, in most cases, also a supermarket—and the open-air markets—publicly managed groupings of stalls that occupy streets, squares, or parks in many municipalities on a weekly or biweekly basis. Section 3 presents the methodology of the quantitative analysis. The first subsection (3.1) measures the relationship between markets and the metropolitan population to assess their potential as proximity providers of food on foot. The second subsection (3.2) examines the distances between market halls to develop hypotheses about networking and to propose pedestrian routes that promote local centers of activity. Finally, a series of considerations are presented on the possibilities of optimizing the system of markets to achieve a healthier metropolis, guaranteeing that a slow rhythm habitat—manifested through reduced traffic congestion, greater access to green spaces, and walkable neighborhoods—can enhance residents' opportunities to obtain healthier diets by encouraging active travel to fresh food sources, and supporting community food initiatives, thereby linking territorial tempo with nutritional outcomes (Almanza et al., 2012; Anandhi et al., 2025; Quintero & Restrepo, 2023).

After these sections, the research seeks to address the following research question: Can the distances traveled and time spent on food procurement—both in terms of space and rhythm—affect overall well-being and quality of life in urban communities?

2. Context: Barcelona Metropolitan Area, a Territory Supplied by a Public Food System

Barcelona's metropolitan area comprises 36 municipalities, with the city of Barcelona accounting for 27.6% of the total area (100.3 of 363 sq km) and 49.6% of the population (1,686,208 of 3,398,219 inhabitants; Institut d'Estadística de Catalunya, 2024a). The territory is crossed from north to south by the Marina, Collserola, Ordal, and Garraf mountain ranges; by the Llobregat river in the south; and by the Besòs river in the north (Busquets, 2005) .

The municipalities that comprise the metropolis have maintained their commitment to guaranteeing citizens' access to fresh food, even before the creation of the first common administrative entity in 1974, the Metropolitan Corporation, predecessor of the current Àrea Metropolitana de Barcelona, established in 2011. The infrastructure of food providers that feeds the metropolis responds to a unique supply model and is supported by a public system of public halls and weekly open-air markets that has been continuously reinforced across decades. The food retail offer is complemented by a dispersed network of grocery shops and supermarkets, totalling 17,765 establishments (Àrea Metropolitana de Barcelona, 2014).

On the one hand, the 90 food market halls respond to a wide variety of building types that allow their integration into very different types of urban fabric: The first halls were built in more compact and dense urban fragments; while the latter respond to massive housing estates or open low-density environments, or are in the vicinity of railway and road infrastructures. The commitment to constructing market halls began in 1840. Although the most recent was built in 2016, many existing buildings have been renovated over the past 40 years, as market halls continue to be a priority within the metropolitan facility program. The process was replicated in the towns surrounding the capital city, resulting in a total of 90 markets built over 76 years across the 36 municipalities that have formed the Barcelona metropolitan area since 1976.

In parallel, up to 74 weekly open-air markets—ranging from groups of stalls in peripheral open spaces to those located in dense and compact urban areas adjacent to market halls—intermittently complement the metropolitan food procurement system. Although these temporary infrastructures occupy public spaces and are nearly as numerous as the permanent halls, they do not operate daily. Their offering is limited to fruits and vegetables, and sometimes eggs, dairy products, cold cuts, and pickles, but rarely fresh meat or fish. Weekly markets add a layer of discontinuity to the food system, enabling mobility between elements and their coexistence with other uses. Their low implementation cost allows weekly markets to serve as potential testing grounds for future market hall locations, helping to consolidate the built network of public facilities.

Previous works at the municipal scale of Barcelona that have approached the local food system have been considered in the research. On the one hand, historical research (Guàrdia & Oyón, 2010; Miller, 2015) has highlighted the uniqueness of the local food system in Barcelona, which preserved its market halls—and even built new ones—while many other European cities demolished theirs, viewing them as incompatible with the modernity their urban centers were expected to embrace. On the other hand, topological research (Fuertes & Gómez-Escoda, 2020; Gómez-Escoda, 2025) has recently highlighted the potential of the public system of market halls to trigger neighborhood centralities and lead a change in designs and policies related to food suppliers. Finally, the contribution of the privately-owned small-scale providers to accessibility to healthy food in terms of availability has also been discussed (Gómez-Varo et al., 2023; Goossensen et al., 2023).

The role of the spatial distribution of food providers in shaping the quality of life has also been tackled in relation to metropolitan Barcelona. Recent investigations show how lower-income neighborhoods and areas with a higher proportion of non-Spanish residents tend to have reduced access to organic food outlets, reflecting broader patterns of spatial inequality, as unequal access to food retailers, particularly those offering fresh and healthy options, tend to exacerbate urban health disparities and social inequalities (García et al., 2020). Similarly, research has demonstrated that Barcelona's compact urban form facilitates greater walkability and supports more equitable access to everyday services, including food provisioning, thereby enhancing residents' well-being (Marquet & Miralles-Guasch, 2015). These findings are echoed in policy-oriented initiatives such as the Barcelona City Council's Healthy and Sustainable Food Strategy 2030, which highlights the importance of an equitable food retail network for achieving food justice and improving quality of life across all city districts (Ajuntament de Barcelona, 2021). Moreover, the Barcelona Challenge for Good Food and Climate emphasizes the spatial dimension of food vulnerability, calling for structural reforms in the urban food system to ensure sustainable and nutritious diets for all (Herrero & Carrascosa, 2022).

Considering this background, and drawing on the aforementioned closeness and betweenness analyses, this article develops two main approaches for assessing the quality of the urban food system in metropolitan Barcelona: (a) the degree of potential demand to which fresh markets are subject, and (b) the distances between public food supply facilities. In this regard, the results of this research indicate that halls and open-air markets ensure access to fresh food and qualify the territory as well supplied.

3. Methods: Unfolding an Approach to Barcelona's Market System Through Closeness and Betweenness

The research begins with the potential of the food system to be accessible on foot and translates it into a topological analysis that quantifies the relation of distances that markets establish. The analysis makes use of the increasing accessibility of information—via digital archives and open cartographic resources—and the potential of geographic information systems (GIS) to both measure and visualize urban phenomena. Two approaches are taken based on the same data sources. The first examines journeys on foot around market halls and open-air temporary markets to observe the degree of territorial coverage offered intermittently by both complementary systems. The second approach drafts the distances between market halls, regarded as a metropolitan infrastructure with the capacity to activate urban centralities and pedestrian movements connecting them.

In both cases, a common methodology was used to prepare the specific calculations. The plot map for the entire metropolis was obtained from the Cartography Geoportal (Àrea Metropolitana de Barcelona, 2025). Data concerning road networks and urban plots were sourced from the Spanish Cadaster (Sede Electrónica del Catastro, 2025). Demographic data were derived from the Statistical Institute of Catalonia's population register (Institut d'Estadística de Catalunya, 2024a). Data on population were extracted from Població de Catalunya georeferenciada (Institut d'Estadística de Catalunya, 2024b), which consists of a geolocated population count on a dynamic 62.5 × 62.5m grid, with the most up-to-date information from 2016. The aggregate population has been allocated pro rata to the built-up roof of each plot.

QGIS is used as the main tool to complete the georeferencing tasks, produce maps, and estimate quantifications. The urban street network is based on Open Street Maps, and Open Route Service and the

QNEAT3 plugin have been used to establish isodistances to calculate routes and catchment areas. Graph analysis is used to determine weighted networks through betweenness centrality measurements (Sevtsuk et al., 2016), in which each market place is considered a node so that shortest paths between nodes are established, and in which the weighted proportion of capacity is related to the number of households in a shortest path of 400 meters around each market so that the degree of service to residents can be calculated. The closeness analysis counts the amount of footfall passing from given points, when households are set as origins, and destinations are either market halls or temporary open-air markets.

3.1. Halls and Open-Air Markets as Nodes of Closeness Centrality

This section quantifies the relation between markets and the resident population around them in affordable distances, set at 400 meters – 5 minutes on foot for middle-aged people without functional diversity, taking an average speed of 1.31 meters per second (Murtagh et al., 2020). To evaluate these daily journeys, accessibility is not measured by identifying locations that are closest to as many customers as possible (Sevtsuk, 2020), but in a basic calculation that relates travel time between market halls and households, as the research only considers one of the multiple layers of activity at the sidewalk level.

To determine the population within 400 meters walking distance from each market, Open Route Service is used to generate isochrones, delineating catchment areas based on pedestrian accessibility. For the sake of a clear territorial understanding at both large and medium scales, the base road network was simplified to a single-axis model, disregarding variations such as pavements or dedicated lanes for public transport and cycling. Each market's routing itineraries are unique, illustrating: (a) the relative share of population within the catchment area of each market in relation to the entire system, and (b) the relative significance of each route within the full set of itineraries constituting the market network. To ensure accurate route calculation, manual verification is conducted to confirm the continuity of network axes and the topological consistency of intersections, particularly regarding pedestrian accessibility and topographic alignment at critical nodes.

Each market's destination point is defined at its geometric centroid. For permanent market halls, a more granular approach may be warranted in future research to account for multiple access points, adjusting centroid placement accordingly. In the case of temporary markets—often located adjacent to market halls or in expansive public spaces such as streets, squares, or parks—multiple destination points are assigned to reflect their spatial extension more accurately. Origins of routes are placed at the central point of each residential building façade facing the street. In wide thoroughfares where building fronts are set back from the road, manual adjustments are made to correct mismatched origin points. Similar corrections are applied to large plots fronting multiple streets to eliminate duplicate origins. A data cleansing process ensures that each residential plot is represented by a single origin point, thus preventing the overrepresentation of any given location in the resulting network. Routing pathways are generated using an algorithm applied to the simplified road network, with origin points taken from residential plots and destination points from the markets. While the algorithm efficiently generates routes for most urban configurations, certain wide avenues require manual correction of origin points to align them more closely with the street axis. In some instances, destination points are also relocated manually to better reflect primary access locations or alignment with major routes (Gómez-Escoda & Fuertes, 2022).

Although the generated routes in this process represent connections from residential plots to their nearest markets, they do not inherently capture differences in population density or usage patterns. Two weighting processes are therefore applied. First, each route is weighted relative to the market serving the largest population within the system. Accordingly, line thickness varies proportionally, with thicker lines indicating routes used by a greater number of residents. Second, assuming a homogeneous population distribution within each market's service area, it is considered that longer routes are more frequently used than shorter ones. Therefore, within each market's catchment area, routes are additionally weighted in relation to the length of the longest route in that system. Concerning the graphic expression of the calculations, and in order to make the area of proximity to the markets more visible, isochrones are added at 5, 10, and 15 minutes from the points of origin of the weighted routes. The resulting map is presented in Figure 1, and the associated data are disclosed in Supplementary File 1. To ensure the most accurate interpretation of the system's behavior, the halls (blue) are distinguished from the open air (magenta).

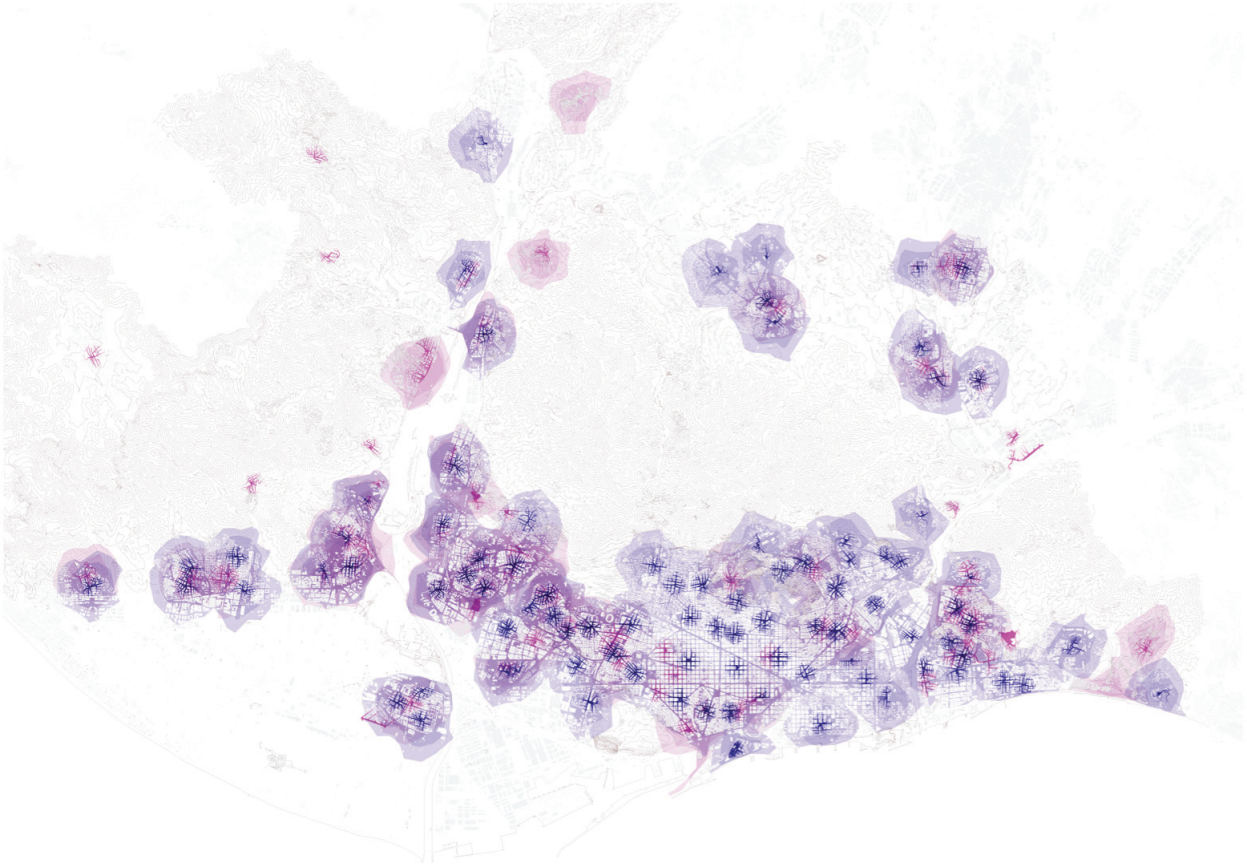

Figure 1. Closeness map around halls and open-air markets in metropolitan Barcelona, 2025.

3.2. Pathways Connecting Markets as Potential Betweenness Catalyzers of Activity

In a parallel analysis, the shortest pedestrian routes between market halls are outlined. The hypothesis here is that the search for these minimal routes between markets that reflect human movement patterns may uncover intermediate locations that could supplement the provision of food with other essential commodities. As walkable access to urban services—food supply in this case—depends on the actual travel distance through the street network, rather than just straight-line distance, knowing the shortest paths between them can

become essential for evaluating how easily people can reach key destinations (Boncinelli et al., 2025). At the same time, although pedestrians often navigate based on the general direction of their goal, shortest paths offer a valuable baseline for assessing the efficiency of real-world navigation and for informing better city planning (Bongiorno et al., 2021).

To calculate the shortest walkable paths between the access points of each market and the nearest market, this study utilizes the QNEAT3 plugin within QGIS. The QNEAT3 plugin enables network analysis over vector-based road data, used to calculate least-cost routes between a given set of spatial points—in this case, 90 market halls—employing a walkable road network as the underlying graph structure. The functionality of these tools is predicated on the implementation of Dijkstra's algorithm, which facilitates the identification of minimum-distance paths based on a designated cost attribute—in this case, estimated time. The road network dataset is preprocessed to ensure topological connectivity, thereby facilitating accurate routing across the urban fabric. This method provides both vector outputs of route geometries and tabular data expressing pairwise distances, which are essential for subsequent spatial accessibility analysis. Concerning the graphic expression of the calculations, and to make the area of proximity to the vertices more visible, 400-metre circles highlighting the urban fabric were added to highlight the markets' locations. The resulting map is presented in Figure 2, and the associated data are disclosed in Supplementary File 2.

Figure 2. Betweenness map relating market halls with their closest pair in metropolitan Barcelona, 2025.

4. Results: An Approach to Measuring Food Supply Proximity

This section presents the results obtained in the measurements, which show a twofold reality in relation to food supply proximity. In terms of environmental characteristics, compact and dense environments are defined by the physical contiguity of public suppliers and the proximity between market halls. This results in the formation of urban nodes characterized by high levels of activity intensity. Conversely, in suburban areas, distinguished by a more rugged topography and a greater reliance on infrastructure, each of the suppliers assumes a pivotal role in municipal activity.

4.1. Closeness to Households

Calculations and mapping of the potential demand to each of the 90 metropolitan market halls and 74 open-air markets shed light on the nuances of the system in relation to urban fabric type and diversity of use. From Supplementary File 1, which lists the population within a 400-metre distance from every marketplace in the metropolis, some considerations can be taken. Market halls potentially serve 1,025,198 people living within a 400-meter distance, which is equivalent to an average of 11,309 inhabitants per building. This represents a service slightly lower than that of the temporary markets, which at the same distance procure food to 888,055 people, that is, 12,000 on average. Adding one system to the other, the average figure of service for each of the public markets is 11,666 people. These figures suggest that, if temporary markets are already assuming a role of higher service than that of the market halls, they could be used as a natural lever to strengthen the metropolitan food system, filling some existing service gaps in the territory.

In topological terms, it is possible to find some fragments of the metropolis in which weekly markets and market halls are tangent or overlap. Some temporary markets reinforce market halls, overlapping the service, overflowing the activity, and attracting customers from the surrounding areas; others fill food gaps and take responsibility for feeding an entire neighborhood with fresh food; and others are embedded between the areas served by market halls and generate territorial continuities that constitute food routes that could be considered structuring for the metropolitan form. Ultimately, when open-air markets are integrated into suburban areas, they can strengthen local food supply resilience by connecting nearby food production with consumers, reducing reliance on distant sources, and enhancing community food security.

Figure 3 highlights six fragments—5,000 by 5,000 meters—of Figure 1 in more detail, so that situations related to the diversity of metropolitan urban fabrics and the distribution of food suppliers can be observed: (a) temporary markets connect two market halls and leave another two isolated—which in turn serve a considerably smaller number of citizens; (b) the temporary markets are attached to the halls, and the contiguities are clearly interrupted by a motorway in the north–south direction, and in a less obvious way, by the railway in the east–west direction; (c) the temporary markets are staggered with the halls inserted in the grid; (d) two temporary markets bond the urban fabric and barely leave the residential fabric without service when they are in operation; (e) while the left fabric depends exclusively on market halls, the right area ensures the food supply of the urban fabric with overlaps between open-air markets and halls; and (f) despite the density of halls and temporary markets that are attached to them, the few free spaces left by the system are also temporarily occupied with open-air markets.

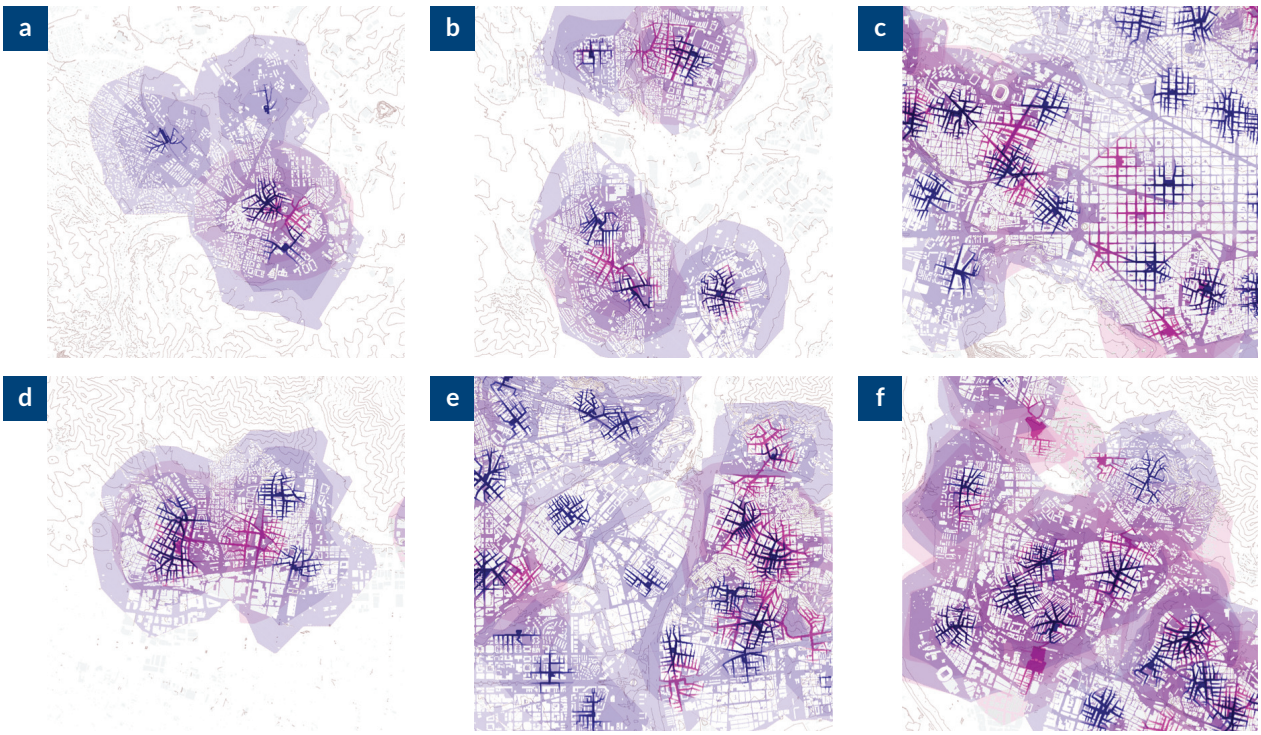

Figure 3. Six fragments of the closeness map around halls and open-air markets in metropolitan Barcelona, 2025.

4.2. Betweenness in the Food Permanent Infrastructure

The research shows that most market halls have another market at an average minimum distance of 1,280 meters, following pedestrian paths. The closest couple of buildings according to this criterion are 400 meters apart from each other; the pair of markets that are the most distant from each other are 5 kilometers apart. Disregarding the metropolis and considering only the city of Barcelona, the closest at are 600 meters from each other; on the other hand, the furthest pair are 2,200 meters apart.

Figure 4 highlights six fragments—5,000 by 5,000 meters—of Figure 2 in more detail, so that different hypotheses of civic networks between metropolitan markets are presented: (a) market halls are separated not only by the longest distance of 5 kilometers but also by the topography, which places the shortest pedestrian path to the valley of the river, next to a road and a motorway; (b) distances depicted would enable synergies between the markets of the first two municipalities (separated by 1.6 km) and between those of the second pair (separated by 1.3 and 1.5 km); (c) cluster of market halls belonging to four different municipalities, at distances between 600 and 1,600 meters; (d) networks formed by distances between 400 and 1,600 meters; (e) concentration of clusters formed by groupings of two or three markets in the northeast of the metropolis, which present relative distances between 600 and 1,800 meters; and finally (f) a central fragment of Barcelona is shown in which 18 market halls appear at distances between 700 and 1,800 meters.

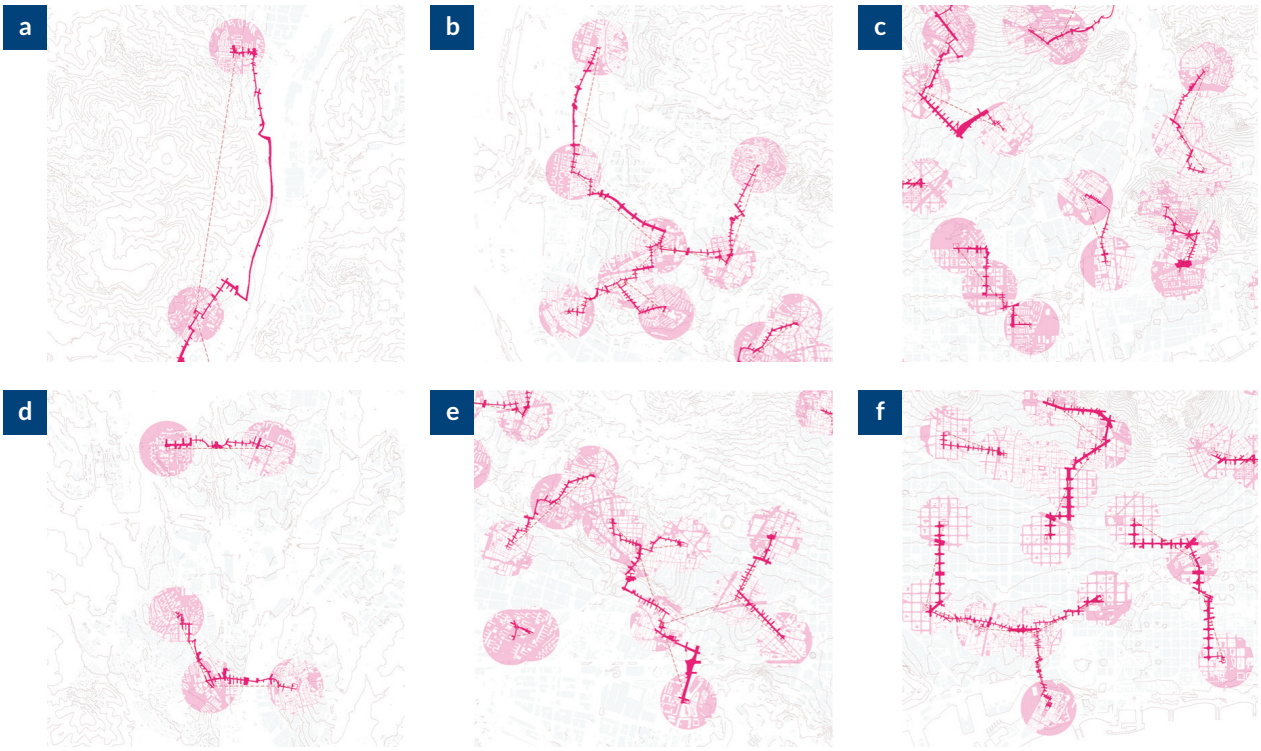

Figure 4. Six fragments of the betweenness map relating market halls and their closest pair in metropolitan Barcelona, 2025.

5. Discussion

The coupling between space and time is present in all steps of the food chain: production, transport, supply, preparation, consumption, and organic waste management. This fact triggered the comparison between meals in an agricultural society and a contemporary society by Ellegård (2018), which in turn exemplified the differences between short- and long-distance societies (Hägerstrand, 1988). The passage of groceries from food providers to households—from collective to domestic pantries—is, in the case of compact urban realities, related to movements on foot and, therefore, to proximity considerations. The understanding of these network dynamics can inform planning strategies that aim to enhance the role of markets as central nodes in both urban and suburban contexts (Fuchs-Chesney et al., 2023). Thus, recognizing and enhancing the intermediary role of markets, particularly in low-connectivity settings, is essential for improving territorial equity in food provision.

The concept of proximity has gained prominence in urban agendas, especially in the wake of the Covid-19 pandemic, which underscored the importance of accessible essential services within neighborhoods (Crosas & Gómez-Escoda, 2020). The "15-minute city" model exemplifies this shift, advocating for urban designs where residents can access most necessities within a short walk or cycle, thereby enhancing livability and sustainability (Klebl et al., 2022). In this context, closeness centrality is a pivotal metric in urban network analysis, quantifying how accessible a particular node is to all others within a network. This measure is instrumental in assessing the spatial integration of locations, thereby informing decisions related to service provision and infrastructure development. Normalized closeness centrality can be used to evaluate the

impact of catchment area locations within idealized urban networks, offering insights into optimal service placement (H.-H. Chen & Dietrich, 2023).

Betweenness centrality, on the other hand, is a key indicator of a node's potential to act as an intermediary in the flow of movement across urban networks, which offers valuable insights into the spatial function of market halls and open-air markets within metropolitan food systems. In dense and compact urban areas, where street networks are more continuous and interlinked, markets positioned at nodes of high betweenness centrality can act as spatial and social connectors, supporting frequent and diversified flows of pedestrians and facilitating efficient access to food (Mehmood et al., 2021). Marketplaces serve not only local neighborhoods but also function as bridging points within larger urban structures, integrating food access into daily mobility patterns, so that retailers situated at nodes with elevated betweenness centrality tend to attract higher footfall due to their strategic placement within the urban grid (Buzzacchi et al., 2021). This positioning not only enhances the accessibility of food resources but also integrates these markets into the daily routines of urban dwellers. Localized betweenness analysis reveals how even within broadly centralized cities, particular sub-centers or market nodes can emerge as key intermediaries depending on street hierarchy and spatial structure (Yamaoka et al., 2021). Conversely, in suburban contexts characterized by fragmented or hierarchical street networks, markets often exhibit lower betweenness centrality, reducing their potential as connectors and limiting multimodal access. Spatial normalization of betweenness metrics is crucial in such areas, where structural decentralization may distort raw centrality values, masking spatial inequities in access (Werner & Loidl, 2023).

From the reading of the resulting maps and tables presented in this article, a characterization of the urban fabric can be depicted that allows an analysis both at the metropolitan and neighborhood scales. First, there are iteration places where proximity routes around the markets branch out through the municipalities, crossing without overlapping with any main road itinerary. Second, the distribution of food suppliers reflects a morphological reading in which various urban patterns are visible: the regular grids of the 19th-century and modern city extensions; the irregular radial plots typical of the old population centers; the sinuous plots that follow contour lines in areas where the topography is more accentuated; or the unique plots of residential estates, made up of isolated blocks. Third, some asymmetrical and distorted routings reflect the lack of permeability and the discontinuities of the urban fabric as a result of its proximity to large territorial roads, railways, and water infrastructures. Fourth, some food oases are identified, where a clear concentration of permanent and temporary markets in certain areas can serve as a valuable tool for prioritizing streets that could be pacified or redeveloped due to their role as a concentration of essential services. This observation may help guide the consolidation of new shortest pedestrian paths with a certain potential for urban structuring. Ultimately, the existence of food deserts, understood as areas in which procurement cannot be resolved on foot, has been identified. This phenomenon contributes to the exacerbation of inequalities among residents by impeding the guarantee of a sufficient food supply within walking distance.

The research presents some limitations, both from a methodological and a conceptual perspective, to be implemented in future studies. Among them, it is worth mentioning some data that would be decisive to qualify the above observations. For instance, convenience stores have not been considered in this regard. However, in the smallest municipalities, it is more probable that the supply will be provided by a corner store than by a public market. This omission is partly due to the lack of an updated database (the research is based on the latest open census, dated 2014), which would allow for a more accurate automation of calculations

and proximity distances. Furthermore, the escalating costs of goods in the most central and tourist-pressured areas of the metropolis have not been considered. These areas have experienced a notable increase in prices, which has led to the transformation of marketplaces into catalysts for gentrification. This has resulted in a distortion of their original function of supplying essential goods. Additionally, the temporal parameters of market opening hours, which are considerably more constrained than those observed in convenience stores, have not been duly considered. Moreover, the data have not been filtered according to the days of the week, considering all markets—both halls and open-air—in absolute terms. This is in contrast to the more comprehensive service provided by market halls as opposed to temporary markets. Finally, recognising the pivotal role of markets in connecting food production and consumption, a more thorough examination of spatial and socio-economic dynamics would enhance the study's contribution to urban food planning.

Despite the mentioned shortcomings, the preliminary findings of this research can be used to develop targeted interventions in different urban contexts. First, in areas that do not seem to meet the theoretical conditions for a balanced food supply, policies should focus on improving the conditions by proposing new nodes for the provision of food. Second, in areas that already present a considerable potential for well-balanced food procurement, efforts should be directed at reinforcing new synergies between existing elements, or solutions could be implemented in the set to increase its efficiency, and guarantee that vital spaces are not triggering dynamics of social exclusion.

6. Conclusion

Food supply is an essential daily activity, historically linked to the origins of urban development and serving as a thermometer of cultural differences and social inequalities in contemporary metropolises. In the contemporary context, there is an economic and technological evolution towards life models based on living models that are not dependent on food purchases. Concurrently, there has been an increase in inequalities, especially since the onset of the pandemic, which has resulted in heightened food insecurity.

This has led to an urgent need for planners and designers to directly engage in the establishment of tools that promote equal and fair access to food. Reading and measuring the food supply system in relation to urban fabrics and households is considered essential to detect weaknesses and opportunities in the food supply system. Despite the fact that this study is grounded in a concrete reality, the methodology for measuring supplier proximity can be replicated in other realities. Moreover, the comprehensive analysis is expected to enhance the supply infrastructure in Barcelona by proposing new nodes for food distribution, establishing novel synergies between existing system components, and implementing corrective measures to enhance overall efficiency.

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Conflict of Interests

The authors declare no conflict of interests.

Supplementary Material

Supplementary material for this article is available online in the format provided by the authors (unedited).

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ARTICLE

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Transformative Bottom-Up Change in Highly Dynamic Food Environments: Learning From Living Labs in Africa

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Abstract

The relationship between food environments, diets, and consumption practices is essential in improving nutrition and health outcomes. Despite growing research in higher income countries on such interactions, less is known about food-environment dynamics in lower income countries, where food insecurity, malnutrition, and informal markets play a key role. HealthyFoodAfrica is a five-year research and innovation project aimed at promoting more sustainable, equitable, resilient, and health-enhancing food systems in 10 African cities by reconnecting food production and consumption. In each locality a bottom-up food system lab (FSL) was established as a driver for co-creating a range of interventions across the food system. This article first presents a food environment lived-experience framework based on practice and theory, allowing for a contextualized understanding of food environments in these diverse settings. It regards the food environment as a dynamic constellation, in which FSLs co-create and drive bottom-up initiatives directing food environment dynamics towards the common goals of improved health and better sustainability outcomes. We map the focus and impact pathways of interventions from four selected FSLs within their local food systems, recognising that the complexity of these informal urban environments makes isolated causal effects difficult to discern. Examining these diverse interventions through a common analytical lens enabled us to identify unique trajectories, as well as shared mechanisms, in how urban food environments evolve. To conclude, we discuss the implications of our findings and provide recommendations on how informality, bottom-up dynamics, and self-organisation can be better supported in urban planning in African cities.

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Keywords
bottom-up governance; food environments; food security; healthy and sustainable diets; informality; lived experience research; social practice theory

1. Introduction

Rapid urbanisation is profoundly transforming food systems across Africa, giving rise to dynamic urban food environments that shape dietary and environmental outcomes, as well as the equity and resilience of food systems. Recent studies underline the complex interplay between food environments, dietary choices and malnutrition in low-income urban settings (Battersby & Watson, 2018; Turner et al., 2018). Food environments, encompassing the physical, economic, and socio-cultural settings in which people acquire and consume food, are now recognised as critical in shaping what people eat (Blake et al., 2021). Consequently, improving urban diets and nutrition requires engaging with these environments as potential levers for change (HLPE, 2017). However, our understanding of how African urban residents actually experience and interact with the real-world dynamics of food environments remains limited (Turner et al., 2020).

Many African cities are marked by sprawling informal settlements, fluid markets, and self-organising community networks that defy the formal/informal dichotomies of classic food environment assessments (Crush & Riley, 2018; Skinner & Haysom, 2016). Given this complexity, African urban food environments are better seen as "messy" and constantly evolving social realities with unpredictable dynamics (Law, 2004). Current governance responses to promote healthy diets remain largely top-down, formalised, and linear and have often proven ineffective in addressing complex food environment changes (Battersby & Watson, 2018). There is a need for alternative bottom-up approaches and locally grounded interventions that engage communities in guiding dietary transitions toward healthier and more sustainable outcomes (Nikolaidou et al., 2023). Reviews of real-world and living-lab experiments confirm that empirical insights into how bottom-up, co-creative processes unfold, and how they can be steered, remain scarce (Bulkeley et al., 2016; Steen & van Bueren, 2017). Our article explores how food environments, diets, and everyday consumption practices interact in African urban contexts, with a focus on low-income areas characterised by food insecurity, malnutrition, and informal markets. Using experiences from real-world living-labs, we provide insights into how transformative changes in highly dynamic food environments can be realized from the bottom up, ultimately orienting food systems toward healthier diets.

Under-nutrition and other forms of malnutrition exemplify the urgency of this challenge. One in every five people in sub-Saharan Africa is undernourished, a proportion that has been rising since the Covid-19 pandemic and is projected to increase further due to climate change, rapid urban growth, and persistent poverty (van Dijk et al., 2021). Urban malnutrition is characterized by a "triple burden": the coexistence of under-nutrition, micronutrient deficiencies, and rising overweight and obesity, all linked to poor diets (Ahinkorah et al., 2021). In slum areas, for example, 26–50% of children under five are stunted, indicating severe chronic under-nutrition (Mutisya et al., 2020). At the same time, global forces such as volatile food prices, climate-induced shocks, and aggressive marketing of ultra-processed foods are destabilizing local diets (Holdsworth & Landais, 2019). In addition, diets across Africa are shifting away from traditional, plant-rich foods toward more processed, Western-style patterns, driven by globalisation, urbanisation, modernisation, and an "urbanisation of poverty" (Temba et al., 2025). These dietary changes are associated

with rising rates of obesity and diet-related non-communicable diseases, and also pose sustainability concerns. Westernized diets generally have higher greenhouse gas emissions and resource demands than Africa's indigenous diets, which tend to be more plant-based and locally sourced (Oniang'o et al., 2025). These trends underscore that improving nutrition in African cities is not merely a matter of increasing food supply, but of fundamentally reshaping food environments and consumption patterns to support sustainable healthy diets (FAO & WHO, 2019).

In what follows, we present our conceptual framework informed by social practice theories, which enables us to centre lived experiences in our understanding of urban food environments. Our investigation is grounded in the HealthyFoodAfrica (HFA) project, a five-year initiative (2020–2025) operating in 10 African cities. HFA established a series of bottom-up food system labs (FSLs) as "living laboratories" for co-creating context-specific food system innovations. Instead of imposing external solutions, each FSL convened local stakeholders, including producers, vendors, consumers, and policymakers, to design and implement interventions tailored to local needs. This article focuses on four FSL cases: Kisumu (Kenya), Fort Portal and Rwamwanja (Uganda), and Cotonou (Benin). Each case targets different, interrelated food environment elements (e.g., urban agriculture, nutrition education, markets, and food safety). They span a range of urban contexts, ranging from dense informal settlements and inner-city markets, to a peri-urban refugee town, all characterized by informality and rapid growth. We map the focus and impact pathways of each intervention within its local food system, while recognizing that the complexity of these informal urban environments makes isolated causal effects difficult to discern. Examining these diverse interventions through a common analytical lens allows us to identify unique trajectories as well as shared mechanisms in how urban food environments evolve. Finally, we discuss the implications of our findings and conclude with recommendations for urban planning in African cities.

2. Conceptual Framework

2.1. FSLs as Consumption Junctions

The overall goal of the HFA project is to make food systems more sustainable, equitable, and resilient by reconnecting food production and food consumption in effective ways. The FSLs serve as experimental "consumption junctions" that focus on where consumption practices and provisioning systems intersect (Cowan, 1987). Extending Cowan's concept from technology adoption to food provisioning, we treat elements of the food environment, such as supermarkets, open-air markets, and community gardens, as consumption junctions. In these spaces, consumers turn broad ideas about health, ethics, and the environment into acquisition practices: the foods they buy or otherwise obtain for consumption (Oosterveer et al., 2007). Drawing on the Chicago School's portrayal of the city as a natural laboratory for the study of collective human behaviour (Park et al., 1925), we frame each FSL as a real-world experimental site in which citizens, vendors, and officials co-create diverse and alternative provisioning–consumption couplings. These are, effectively, experiments in consumption practices in the real world, where citizens are the experts in the context in which they live (Brons et al., 2022). Contemporary living-lab methods build on the Chicago School's tradition—embedding researchers and citizens in co-creative experimentation, allowing them to co-create and study how new practices arise, stabilise, or fade within an urban setting (Chronéer et al., 2019).

2.2. Social Practice Theory

Consumption choices are embedded in everyday routines and social contexts (Spaargaren & van Vliet, 2000). The consumption junction defeats the idea of a one-way influence on consumer behaviour, seeing the food environment as the emergent outcome of a myriad of interactions between citizen-consumers and the systems that provision food. To capture this dynamic, we adopt a social practice theory lens in order to understand urban food environments as lived systems. Practice theory shifts the focus from individual decisions or static structures to the routine practices through which people procure, prepare, and consume food (Halkier & Jensen, 2011). In African cities, this means seeing food environments as the lived reality of how people find, eat, and sometimes produce food each day, rather than as static "foodscapes" defined only by shopping locations or food availability metrics (Spires et al., 2023). Schatzki's (2002) concept of the "site of the social," central to social practice theory, reinforces this view: an urban food environment is a nexus of interrelated practices and material arrangements. A marketplace or community garden is not just a physical location but an ensemble of activities, norms, and artefacts that make up the social life of that place. Viewing urban food environments as sites produced through practice helps explain how shifts in practice (for example, adopting urban gardening or new cooking habits) can ripple through and reconfigure the food environment over time. This approach builds on recent models that integrate practice theory into food environment research and highlight the messiness and volatility of consumption patterns in cities (Brons et al., 2020; Wertheim-Heck & Raneri, 2020), extending them to Africa's highly informal, fluid contexts.

2.3. Urban Informality and Self-Organisation

A practice lens also highlights the hybrid nature of African urban food systems, notably the blurred lines between formal and informal food markets and the prevalence of bottom-up organisation. The informal food sector is pervasive and central: most urban residents, especially lower-income households, get most of their daily food from informal markets and street vendors. Here, informality is not just a lack of regulation; it is an "organising logic" of urban life (Roy, 2005), a set of flexible arrangements through which communities secure food. These informal markets are often essential for food security, providing affordable, convenient access where formal retail is scarce (Holdsworth & Landais, 2019). For instance, one review found street foods contribute 13–50% of adults' daily energy intake in African cities (Steyn et al., 2014). Far from being a stopgap for the poor, informality can be a resource for innovation and resilience: informal vendors respond quickly to changing demand and community networks fill gaps in provision during crises (Banks et al., 2020; Vorley, 2023). Our framework therefore treats informal practices and actors as fundamental components of the food environment. Notably, many of these informal food system innovations emerge through community self-organisation, sometimes filling gaps left by the state and at other times operating in parallel beyond the state (Boonstra & Boelens, 2011; Polese, 2021).

Figure 1 outlines our practice-oriented framework to analyse how FSL interventions modify local food practices. For each case, we mapped how daily activities intersect with available food sources, and how the intervention shifts those interactions. Importantly, we treat diets as both the guiding aim of these interventions and a dependent variable that emerges from changes in practice, rather than a directly measured outcome. Instead of quantifying short-term dietary changes, we focus on how interventions reshape the practice context in ways expected to enable healthier dietary patterns over time.

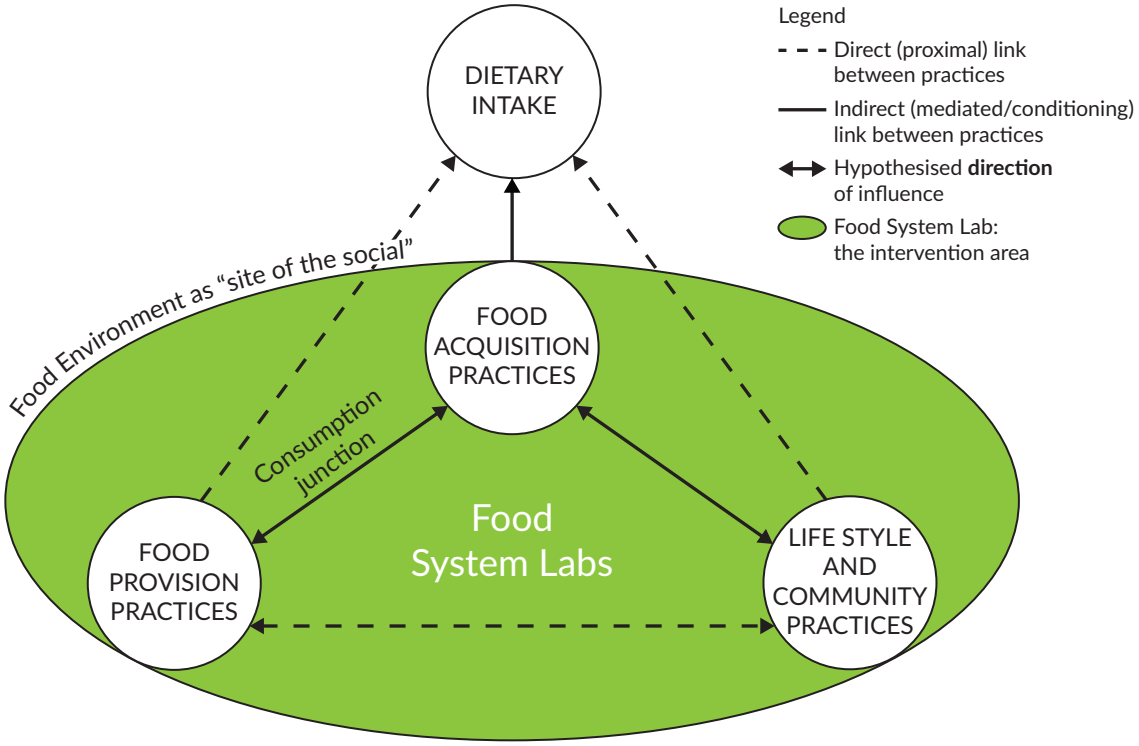

Figure 1. Conceptual framework. Source: Adapted from Wertheim-Heck and Raneri (2020).

3. Methodology

This study employed a multi-case participatory action research (PAR) design, using mixed methods, to capture the unique complexities of dynamic food environment interactions, while also identifying broader conceptual themes across multiple cases (Fletcher et al., 2015). Following comparative urbanism, we mix qualitative and quantitative survey items with ethnography (Robinson, 2022). The use of social practice theory is particularly well-suited for living lab research (Hasselkuß et al., 2017), forming the theoretical basis through which the lived-experience empirical lens of FSL experimentation is observed and interpreted. Researchers and local stakeholders co-developed and tested solutions in real-world settings, forming a joint process of knowledge-production (Bergold & Thomas, 2012). Using an ethnographic orientation in PAR enabled close engagement with everyday realities, enhancing the depth and contextual sensitivity of the research. This design allowed us to both enact changes through FSLs and analyse how these changes unfold in practice.

3.1. Case Studies

Empirical research was conducted within the HFA research and innovation project, which established FSLs in 10 African cities and supported them through thematic and cross-cutting work packages. Each FSL was initiated by or built upon a previously existing multi-stakeholder platform by a local organisation in its urban locality and received methodological guidance and monitoring from the thematic work packages. For this article, we selected four FSLs for an in-depth, comparative analysis: Kisumu (Kenya), Fort Portal and Rwamwanja (Uganda), and Cotonou (Benin; see Figure 2 for locations).

Figure 2. Overview of the geographical locations of the four FSLs.

These FSLs were selected because of the multifaceted nature of the food environment transformation that they entail. Together they represent a meaningful diversity of urban contexts and challenges. Cases were purposively sampled using two criteria: (i) completeness and conceptual comparability of evidence and (ii) that they represented maximum variation across urban contexts and food-system challenges. Four out of 10 FSLs completed baseline and endline assessments and maintained consistent qualitative/ethnographic records, out of which the three most diverse cases were selected (Cotonou, Kisumu, Fort Portal); Rwamwanja was included to represent a peri-urban refugee context and because it generated rich qualitative data. Each case targets different, interrelated food-environment elements (e.g., urban agriculture, nutrition education, markets, and food safety). Table 1 provides an overview of the selected cases.

Table 1. Summarised characterisation of the four FSLs (compiled from external sources). References are included in the detailed FSL descriptions (results section).

FSL	Kisumu (Kenya)	Rwamwanja (Uganda)	Fort Portal (Uganda)	Cotonou (Benin)
City Characteristics	Lakeside conurbation; ~600,000 inhabitants; rapid rural influx fuels dense, sprawling informal settlements	Peri-urban refugee settlement; ~100,000 inhabitants; high density; still expanding with Congolese refugee waves	Fast-growing trade/tourism centre; ~470,000 inhabitants; compact urban core draws continual rural in-migration	Coastal metropolitan city; ~670,000 inhabitants; medium density; expanding through steady rural influx

Table 1. (Cont.) Summarised characterisation of the four FSLs (compiled from external sources). References are included in the detailed FSL descriptions (results section).

FSL	Kisumu (Kenya)	Rwamwanja (Uganda)	Fort Portal (Uganda)	Cotonou (Benin)
Food System Challenges	High poverty in informal settlements; widespread food insecurity and malnutrition (only ~21% households are food secure); poor dietary diversity; triple burden of malnutrition	Very high malnutrition; stunting ~41% vs 26% national; low agricultural productivity; limited market access; weak farmer organisations; low dietary diversity	Persistent malnutrition (stunting ~40% among children < 5) despite abundant local food production; poor dietary diversity, low nutritional awareness	High urban poverty; food insecurity (only ~18% households are food secure); high child malnutrition (~36% stunting); emerging overweight in school-age children
Food Environment Type	Urban with large informal settlements; very high informality in food supply	Peri-urban refugee settlement; highly informal; urban-like challenges despite a rural setting	Urban/peri-urban setting; food landscape dominated by informal markets (street vendors and public markets)	Peri-urban setting; hybrid formal (school canteens) and informal (street vendors) food environment
Level of Food Dependency	*High*—largely relying on other regions and neighbouring countries	*High*—residents heavily rely on external food aid from World Food Programme (WFP)	*Low*—food-surplus region with abundant agricultural output	*High*—significant reliance on external support (school feeding programs aided by WFP); local fresh produce underutilized

3.2. Theory of Change

The theory of change (ToC) approach guided each FSL to articulate long-term goals for food-system transformation and then work backwards to identify the intermediate outcomes, assumptions, and actions to reach this (Awuh et al., 2022). ToC clarifies how and why desired changes are expected within specific contexts by mapping links between activities, outputs, outcomes, and longer-term impacts. Local stakeholders were involved from the start to build participatory impact pathways, ensuring a collective vision and shared ownership of interventions (Blundo Canto et al., 2020). Each FSL developed its own ToC, aligned with the project-wide framework, and updated it iteratively as interventions unfolded through workshops and stakeholder meetings.

3.3. Operationalisation and Data Collection

Based on the conceptual framework (Figure 1), common indicators connected to the framework's components (food provision practices, food acquisition practices, lifestyle and community practices, and dietary intake) were selected. The *modus operandi* of the FSLs followed five phases: (1) each FSL team adapted instruments and sampling plans for the baseline assessment, fitting local interests and needs; (2) quantitative baselines (2021–2022) were implemented with defined populations (see Annex 1 in the Supplementary File for full details) alongside qualitative assessments such as focus group discussions (FGDs) and key stakeholder interviews; (3) findings informed co-design and updates of the ToCs with stakeholders;

(4) interventions were implemented and monitored, and adjusted during the process where needed; and (5) endline assessments (2024) were conducted to assess overall progress. A site-specific exception was Rwamwanja, which only conducted qualitative endline FGDs and documentation as a quantitative baseline assessment was missing. Full quantitative and qualitative particulars (populations, timing, instruments, indicators, and roles) are provided in Annexes 1 and 2.

3.4. Analysis and Reflection

Our study draws on the rich documentation and reflections generated by the FSLs. The authors worked closely with the FSL partners to synthesise and interpret the outputs of these interventions. In addition to the quantitative endline results, we compiled internal project reports, deliverables and blogs, ToC frameworks, multiple online interviews with FSL leaders, impact assessment strategies, annual consortium meeting notes, and other forms of communication during the project (see Annex 2 for full details). This analysis was both iterative and reflexive. We engaged in regular discussions with FSL teams to support the ToC process, validate interpretations, incorporate their experiential knowledge, and remain sensitive to local nuances. Guided by social practice theory, we analysed changes in FSLs at two interrelated levels. First, we examined how changes occurred in the materials, competences, and meanings that constitute food practices (Shove et al., 2012). Second, we considered how practices interconnect in daily life as bundles, tracing how shifts in one practice travel across connected activities such as gardening, purchasing, cooking, and eating. Our conceptual framework (Figure 1) informed how we studied ToC implementation: it enabled us to observe both dynamic practice constellations (changes in elements) and dynamic practice-bundle constellations (changes in how practices interlink, recognising that change rarely occurs in isolation). Within each case we produced ToC-aligned summaries of activities, outputs, and outcomes, which are presented in the FSL-level results (Section 4). We then compared the key mechanisms across the cases and mapped common impact pathways, which are presented in a comparative analysis (Section 5). Throughout, we remained mindful of our double role as facilitators and researchers. The result is a methodology that is inherently adaptive and human-centred, acknowledging that transforming urban food systems is as much about the process of co-learning and empowerment as about technical solutions.

4. Results

Here, we present the results for the four FSLs, covering an overview of their key food system characteristics, FSL interventions, outcomes and impacts, and lessons and insights.

4.1. Kisumu FSL, Kenya

Kisumu City, situated on the shores of Lake Victoria, is Kenya's third-largest city with approximately 60% of its 600,000 inhabitants living in informal settlements characterized by high population density and poverty (County Government of Kisumu, 2023). Kisumu FSL targets several urban informal settlements, such as Manyatta A, Manyatta B, Obunga, and Bandani, where food insecurity is pervasive and diets are lacking in variety, especially among children (Wagah et al., 2018).

4.1.1. Key Food System Characteristics

Kisumu's food system is primarily informal, with numerous street vendors, informal markets, and unstructured food supply chains dominating food provisioning (Simiyu et al., 2019). The city depends heavily on external sources for food. Much of the food is brought in from other Kenyan counties or imported from the neighbouring country of Uganda, leaving the city vulnerable to external shocks.

Informal traders break bulk goods into small, affordable portions, often relying on informal credit. This informal setup caters for the poorest consumers who purchase food on a day-to-day basis. It also reflects systemic issues: pervasive poverty, volatile food prices, and lack of formal safety nets. Malnutrition rates are alarmingly high in these communities. At baseline, only 21% of households reported being food secure (Annex 1). At the same time, overweight and micronutrient deficiencies co-exist, indicating a triple burden of malnutrition driven by poor quality diets (Sawe et al., 2021). The region has ample agricultural potential, with surrounding rural areas growing African leafy vegetables (ALVs) and Lake Victoria providing fish, yet local consumers often cannot access or afford these foods and imported fish competes with the local fish on the market (Opiyo & Agong, 2020).

4.1.2. FSL Interventions

To address these challenges, the Kisumu FSL implemented a set of interventions focused on promoting the consumption and provisioning of affordable and nutritious foods, particularly ALVs and fish. While the FSL was led by the Alliance of Bioversity International and the International Centre for Tropical Agriculture (CIAT), interventions were jointly developed with the bottom-up engagement of local communities. First, urban gardening demonstration and learning plots were established in six community units, showcasing gardening techniques such as vertical gardens, sack gardens, and other space-efficient methods for growing ALVs. Women and young people were trained by Kisumu County agricultural extension officers and local "urban garden ambassadors," who also established gardens in their homes, serving as learning sites for community members. Harvested vegetables not only improved access to fresh produce for home consumption but created opportunities to sell surpluses to neighbours. Second, an aquaponics system combining fish and vegetable production was established, managed by a community women's group with technical support from county experts.

Alongside enhancing production, the FSL invested in strengthening value chain linkages and governance mechanisms along fish and ALV value chains. A multi-stakeholder platform was initiated, involving farmer groups, fish traders, ALV aggregators, local market leaders, NGOs, and Kisumu County officials. Training sessions were organised to build trust among value chain actors and to improve coordination. The platform facilitated dialogue on market linkages, fair prices, and post-harvest handling, helping to connect producers with urban markets.

Another component was nutritional education and behaviour change communication. The FSL trained community health promoters (CHPs) in nutritional topics such as child feeding, dietary diversification, food safety, and hygiene. The promoters delivered education to informal settlements through home visits, group sessions, and cooking demonstrations to encourage practical learning on preparing healthy and nutritious meals using local ingredients. Importantly, all FSL's interventions were implemented in a participatory

way, allowing community members to engage in the design of interventions and adapt innovations to their context. This emergent, inclusive approach catalysed self-help initiatives (e.g., neighbours forming gardening groups).

4.1.3. Outcomes and Impacts

The Kisumu FSL interventions yielded promising results, with measurable gains for the adoption of urban gardens and improved dietary consumption among women and children. Overall, ownership of urban gardens increased from 4.5% at baseline in March 2022 to 22.4% at endline in August 2024. At endline, 34.8% of intervention households managed gardens compared to only 9.7% for comparison group households.

Using 24-hour recall data (Annex 1), we observed improvements in dietary diversity for children (6–23 months) and women of reproductive age (15–49 years). Among children, the share meeting minimum dietary diversity (MDD-C; ≥ 5 of 8 food groups) rose from 42% to 50%, while the comparison group showed no improvement. At the endline, children's dietary diversity scores (DDS) for the intervention group (3.55) were significantly higher than the comparison group (3.32) ($p = 0.034$). The share of women achieving MDD (MDD-W; ≥ 5 of 10 food groups) increased from 41% to 51% after FSL interventions. Mean DDS for women rose from 4.36 to 4.53, with no significant endline difference between intervention (4.53) and comparison (4.49) groups.

Qualitative reports support these findings. Households with gardens reported consuming ALVs more frequently and even sharing surplus with neighbours. Some households benefitted economically by selling small amounts of produce or fish, thereby increasing their income. While comprehensive income data are not yet available, there are indications that linking ALV farmers to urban markets led to better prices for farmers and a more stable supply for consumers, a win-win for all.

4.1.4. Lessons and Insights

Several lessons emerge from the Kisumu FSL. One key insight is that interventions that integrate supply and demand amplify impact, since improving food production alone would not change nutrition without coupled nutritional education and vice versa ("consumption junction"). Introducing new food sources (such as gardens and aquaponics), alongside behavioural change communication, created synergies and provided people with the knowledge, means, and motivation to diversify their diets.

Another lesson is the importance of community co-creation and ownership. Engaging beneficiaries in design and implementation led to a high acceptance and cultivated a sense of ownership, helping ensure that initiatives will continue beyond the project. It also highlighted the vital but previously undervalued role of existing community structures such as CHPs and urban garden ambassadors, as crucial agents for change in improving diets and practices. These community structures are also key for continuity, including 118 CHPs trained in nutritional education and equipped with education materials, who will continue with nutritional education under Kisumu County's Ministry of Health, and urban garden ambassadors who will continue training community members using their own gardens as learning sites in collaboration with Kisumu County's agricultural extension officers.

In Kisumu's informal settlements, daily routines of buying, selling, and preparing food constitute the "site of the social" where the food system is produced and reproduced (Schatzki, 2002). Examples include women selling vegetables on roadside mats and families making *ugali* (a thick porridge made from maize flour) each evening. Kisumu FSL's interventions successfully engaged with these existing social practices. Rather than attempting to override people's routines, interventions worked within them: for instance, cooking demonstrations built on improving local recipes and traditional meal patterns using local ingredients which participants brought in themselves, instead of introducing entirely new or foreign recipes. The role of urban informality in food systems was also paramount. Far from considering informality to be a governance gap or hindrance, it was approached as a space of innovation and resilience (Banks et al., 2020; Roy, 2005). The FSL multi-stakeholder platform brought together key food system actors to address challenges in all components of the food system. It provided a safe place where actors could share knowledge and exchange ideas on what worked and what was not working and how to address the shared challenges identified in the FSL, supporting the notion of self-organisation (Boonstra & Boelens, 2011). Overall, the Kisumu FSL underscores the importance of aligning nutritional objectives with local informal practices, economic realities, and social dynamics.

4.2. Rwamwanja FSL, Uganda

The Rwamwanja FSL is situated in the Rwamwanja refugee settlement in Kamwenge District, south-western Uganda. It hosts approximately 100,000 refugees and asylum seekers, predominantly from the Democratic Republic of Congo (UNHCR, 2025). Despite the area's rural appearance, Rwamwanja faces several urban-like challenges, including informality in food markets, limited resources, and socio-economic vulnerability. It can be considered as a peri-urban setting due to its relatively high population density, total population, and limited size of land plots provided to refugees (0.18–0.32 acres per household).

4.2.1. Key Food System Characteristics

Although located in the Kamwenge District, known as the "food basket" of the Rwenzori sub-region, the food system in Rwamwanja is facing severe nutritional challenges, with stunting rates around 40% (UNHCR, 2017), much higher than Uganda's national average of 26% (UBOS & ICF, 2018). The settlement struggles with low productivity in agriculture, limited market access, and weak farmer organisational structures. Nutritional diversity is low, partly due to widespread cultivation of maize in monoculture systems. The lack of farmer associations further limits improvements in food security and nutrition. Residents depend significantly on external food assistance from the WFP (2024a).

4.2.2. FSL Interventions

The Rwamwanja FSL, led by the NGO Finn Church Aid, addressed these challenges by co-developing and implementing several interventions focusing on the empowerment of smallholder farmers. This focused primarily on women farmers, 70% of whom are refugees and 30% of whom are from the host community. A farmers' cooperative and maize processing plant were established with a decentralised extension system involving local village enterprise agents (VEAs). These VEAs provided extension services and helped organise collective marketing. The maize processing facility allowed value addition through producing maize flour and bran, significantly increasing household incomes. To stimulate farmer households to spend the additional income on healthy food, the VEAs and model farmers were trained to deliver nutritional

education campaigns in their communities to promote better diets and to support the establishment of home vegetable gardens and intercropping of legumes with maize.

4.2.3. Outcomes and Impacts

The Rwamwanja case demonstrates the importance of integrating nutritional objectives into broader livelihood strategies. Farmers who adopted legume intercropping reported yield increases of around 20%. Household incomes increased significantly and revenues from maize rose from 500–650 Ugandan Shillings per kg for raw maize sold directly to middlemen to 1500–1900 Shillings per kg for processed maize flour sold through the cooperative (Annex 2). The increase in incomes and the establishment of home gardens and intercropping practices improved both household nutrition and food security. An unforeseen outcome was that the availability of leftover maize bran from processing encouraged local poultry and piggery production, which in turn increased the consumption of nutritious animal-based foods. In 2025, the WFP conducted a re-evaluation of the need for food assistance inside the refugee settlements. Originally, 80% of the 700 participating Rwamwanja FSL refugees received food assistance based on need categories 1 and 2, where 1 = most vulnerable and 2 = moderately vulnerable. After the re-evaluation, this number reduced to 15%, thanks to the positive impact of the project, and 85% of the refugees are now considered category 3, being self-reliant (WFP, 2025, unpublished data).

4.2.4. Lessons and Insights

The Rwamwanja food environment developed dynamically through everyday social interactions rather than formal interventions, illustrating how informal interactions can become a resource for innovation (Banks et al., 2020; Roy, 2005). Informal interactions, for example at the maize processing facility and informal livestock activities using maize bran, created positive economic and nutritional outcomes.

The case also illustrates the importance of time-space dynamics in shaping changes in social practices (Schatzki, 2010) through practices that followed the agricultural seasons (planting, harvesting, processing, and selling) and influenced when, and how, new interactions occurred. Dependency on middlemen initially determined the low maize prices that farmers were receiving directly after harvests, as they had no other option than to directly sell their produce. The maize mill acted as a central “node” anchoring a nexus of new practices: the milling and collective marketing of maize flour over time, processing high-quality maize and retaining by-products, agricultural training sessions, and nutritional education conducted by VEAs.

The establishment of a farmers’ cooperative and the VEA network illustrates the gradual evolution from informal practices and networks into more structured, collective organisations, without losing the flexibility and responsiveness of informal systems. Self-organisation in Rwamwanja was not straightforward but involved substantial trust-building efforts. Refugees and local farmers initially distrusted each other, and refugee farmers distrusted formal structures and external organisations. This required considerable efforts to build trust through continuous dialogue, demonstrating tangible benefits and facilitating joint activities. This careful process allowed informal practices to gradually develop into a structured farmers’ cooperative and extension system, without losing its flexibility or adaptability.

4.3. Fort Portal FSL, Uganda

Fort Portal and the surrounding Kabarole District in Western Uganda represent a rapidly growing urban area with approximately 470,000 inhabitants (UBOS, 2017). Like Rwamwanja, it is located in Uganda's productive Tooro region, renowned for its abundant agricultural output. Fort Portal paradoxically experiences food system challenges, including significant nutritional deficiencies and food insecurity. In particular, children under five years experience high stunting rates of approximately 40% (UBOS, 2018). Fort Portal is popular as a tourist destination, influencing policy priorities around food safety and the promotion of traditional food practices to attract visitors.

4.3.1. Key Food System Characteristics

Fort Portal's food system is marked by a paradox of food abundance alongside persistent malnutrition, driven by inadequate dietary diversity, suboptimal childcare and breastfeeding practices, gender inequality, and limited nutritional awareness. Informal markets dominate the food landscape, with several public markets, street food vendors, and household producers. This creates vulnerabilities related to food safety and inconsistent nutritional quality.

4.3.2. FSL Interventions

The Fort Portal FSL is led by Kabarole Research and Resource Centre (KRC-Uganda), a long-standing NGO committed to understanding drivers of poverty and its solutions. The FSL and its interventions build on earlier food system initiatives and projects, employing a wide and strategic set of activities to foster nutritional improvements across the entire food environment. It builds upon various existing food system actors, including a previously established "coalition of the willing": food ambassadors (influential leaders who promote healthy diets for all in their respective constituencies), street food vendors, formal chefs, farmer groups, Orugali groups (who engage in traditional ways of serving food), researchers, local government, CSOs, NGOs, media, and artists.

The Fort Portal interventions stood out in having reached a large number of people (around 250,000), through a multitude of strategic avenues, targeting informal networks and influential community actors to promote nutritional education. This includes elaborate radio shows (such as broadcasting dramas and educational programmes) and public messages on nutrition. Religious, cultural, and community leaders were engaged as food ambassadors. Additionally, village health teams (VHTs), consisting of local volunteers trained in health and nutrition, were strengthened to conduct nutritional screenings, home visits, referrals, and community education and to enhance local nutritional knowledge.

The food safety approach implemented by Fort Portal FSL emphasized participatory, collaborative governance involving street food vendors, local authorities, and civil society. A vendor's cooperative, SACCO, and a Nutrition Coordination Committee were established, through which it was possible to organise capacity building, co-create training sessions and joint inspections, and help to improve hygiene, operational resilience, and compliance with safety standards. The key to working with informal street food vendors was the building of trust and the potential empowerment through advocacy as an organised group of 200 vendors, thereby enhancing local food governance.

4.3.3. Outcomes and Impacts

Fort Portal FSL's interventions resulted in significant benefits in terms of food and environmental enhancements. The active engagement of influential community actors and regular broadcasts through local media channels resulted in heightened community awareness and better nutrition-related practices. The proportion of respondents with adequate nutritional knowledge rose from 75.4% at baseline to 81.9% at endline and respondents who were confident in preparing a diversified diet meal rose from 36.2% to 46.5% (Annex 1). Over 1,400 VHT volunteers were trained, substantially improving local capacity for nutritional assessment, education, and management. For women, MDD-W increased from 29.5% to 34.9%, and for children, MDD-C increased from 25.9% to 37.3%. The share of households with vegetable gardens notably increased from 23.2% to 39.2%, directly influencing household nutritional diversity and resilience. Although not part of the original project design, religious institutions such as the Uganda Muslim Supreme Council contributed to food and nutrition security through initiatives such as fruit-tree planting campaigns. As trusted institutions, they also played a significant role in nutritional education campaigns, particularly after engaging and training imams and priests on the importance of improved nutrition for a healthy life.

The co-creative and empowering approach to food safety in Fort Portal FSL is an example for many other African cities. After initial mobilisation and organising, vendors reported that they currently have a bigger and stronger advocacy platform than before. The vendors' cooperative, SACCO, enabled many vendors to resume their businesses after the Covid-19 pandemic, when most businesses had to remain closed. These vendors themselves have become empowered agents of change, promoting food safety and hygiene, such as the promotion of clean cooking oil, proper waste management, fresh vegetables, and handwashing. The association's leadership is now embarking on advocacy for the consumption of safer and healthier food, fostering a sustainable street food industry within Fort Portal City and the hinterlands.

The FSL has been very successful in advocacy for local government endorsement and support, establishing nutrition coordination committees at district, city, and sub-county levels. Capacity-building activities and strategic meetings led to critical decisions, such as developing the Fort Portal Food Safety Ordinance, formulating nutrition action plans, allocating government-sponsored radio airtime for nutrition awareness, and establishing a biodegradable waste recycling plant.

4.3.4. Lessons and Insights

The Fort Portal case demonstrates an integrated approach of mass media outreach with strategic stakeholder engagement, close government involvement, and direct collaboration with informal food system actors. It highlights how informal practices and self-organising social systems can be harnessed effectively through deliberate, yet flexible, external interventions. Nutritional improvements in the Fort Portal FSL have not only emerged from formal programmatic interventions, but also through the daily social practices embedded within community networks and interactions. Informal markets, religious gatherings, and radio broadcasts serve as critical spaces (or "sites") where nutrition practices are shaped and reshaped. These informal spaces, not all typically part of the food environment, became instrumental as they leveraged existing socio-cultural trust and networks, enabling widespread dissemination of nutritional knowledge and promotion of behavioural change (Banks et al., 2020; Roy, 2005).

The nutritional messages disseminated by religious and cultural leaders exemplify a shift from loosely connected informal practices towards a more collective, community-driven approach. VHTs further illustrate the self-organising capacity as they integrate community trust with systematic nutritional monitoring and education, operating effectively despite irregular and limited external supervision. The voluntary engagement and organisation of informal street food vendors into an association illustrates how informality can be self-organised and empowering, enabling active participation in formal governance structures to advocate for their needs and gain recognition for their contribution to providing more nutritious and safe food to the public.

4.4. Cotonou FSL, Benin

Cotonou, Benin's largest urban area with around 670,000 inhabitants (INSAE, 2013), faces severe food and nutrition challenges in its peri-urban communities. High poverty and food insecurity mean that many families struggle to afford a healthy diet and only about 18% of households are food secure. These conditions have severe impacts on children: roughly 36% children under five in Benin suffer chronic malnutrition (WFP, 2024b). Simultaneously, overweight is emerging among school-age children. In response, the government launched a National Integrated School Feeding Programme (PNASI, supported by the WFP) to provide daily meals in public primary schools and improve child nutrition and educational outcomes (implemented among both intervention and control groups).

4.4.1. Key Food System Characteristics

The school food environment around Cotonou's schools constitutes a hybrid of formal and informal food provisioning. Formal school canteens provide thousands of children daily with a structured meal, typically rice or maize porridge with beans. This regular meal is crucial for students' nutrition but often limited in diversity and rarely includes vegetables or fruit due to cost considerations and seasonal availability. On the other hand, schools are surrounded by small-scale food vendors and street stalls, representing an informal food environment where children buy additional food such as fritters, grilled corn, or sweet drinks. These informal vendors are key to food access for many students (and teachers), offering convenient and affordable options, but these foods are often energy-dense and nutrient-poor. Thus, children's diets combine formal canteen meals and informal snacks, both providing little dietary diversity. This dependency on low-cost, low-nutrient food reflects broader urban dietary patterns in Cotonou's peri-urban areas, where poverty and unstable incomes constrain food choices. Also, school meals and available local supply of fresh produce are disconnected due to centralized feeding programmes and external aid.

4.4.2. FSL Interventions

The Cotonou FSL, led by the University of Abomey-Calavi and the Alliance of Bioversity International and CIAT, co-created and implemented a suite of interventions to transform the school food environment through urban agriculture and nutritional education. The FSL engaged a wide range of local stakeholders, including teachers, parents, urban farmers, and municipal authorities, in designing context-specific solutions.

Three interconnected interventions were implemented. First, school gardens were established in two public primary schools to supply fresh fruits and vegetables to school canteens and serve as living classrooms for

nutritional education. School teachers and canteen cooks were trained in sustainable gardening techniques and management. Pupils actively participated in operating the gardens, introducing practical agricultural skills into their curriculum. Fresh produce from the gardens was used in preparing school meals, diversifying the menu with fresh ingredients, while surpluses were shared or sold within the community.

Second, weekly nutrition education sessions were conducted for approximately 1,500 school children, as well as teachers, canteen cooks, and some parents. These sessions, led by nutritionists and trained community volunteers, used customized education tools to teach the importance of dietary diversity and good practices in water, sanitation, and hygiene. The educational activities sought to build both knowledge and practical skills, fostering healthier eating habits at school and at home.

Third, Cotonou FSL fostered community engagement and value chain linkages to support sustainable food provisioning for the schools. Over 100 local fruit and vegetable value-chain actors, including urban farmers, traders, and cooperative members from Cotonou and neighbouring communes, were trained in improved production techniques and cooperative management to strengthen the supply of affordable, local produce. By linking these producers to the schools, the FSL encouraged a farm-to-canteen model that integrates informal urban farming into the formal school feeding system.

4.4.3. Outcomes and Impacts

Initial results from the Cotonou FSL are promising, demonstrating both quantitative improvements and qualitative learning (Annexes 1 and 2). Intervention schools saw marked improvements in dietary knowledge and practices among students. The share of students who could explain the concept of a balanced diet increased by 70% from the baseline, while it slightly declined in the control schools. Knowledge on different food groups also increased by 88%. Knowledge gains also translated into healthier behaviour: by the end of the project, fruit consumption was significantly higher in intervention schools, whereas it remained unchanged among control group schools. While overall DDS did not increase, intervention schools nevertheless performed significantly better than control group schools (Annex 1).

Teachers reported that pupils were more willing to try new foods (such as leafy vegetables from school gardens) and shared nutrition lessons with their parents and family at home. School canteen menus in intervention schools diversified by including vegetable stews and fruit servings a few times a week, a practice that was virtually absent before. Cooks and teachers reported greater confidence in preparing balanced meals after training (Annex 1). These findings align with similar studies in sub-Saharan Africa, which often report increased fruit and vegetable intake when gardens and education are combined (Deuri et al., 2021).

Beyond dietary metrics, qualitative insights emphasized the importance of community engagement and the challenges of sustaining change. The FSL's participatory approach proved critical for acceptance. School directors and parents' committees became enthusiastic supporters, viewing the garden and nutrition lessons as tools to improve children's wellbeing and performance. Bottom-up engagement thereby empowered communities to take ownership of food system innovations (Boonstra & Boelens, 2011). Many parents began home gardens or bought more vegetables after seeing their children's enthusiasm, indicating a positive spillover to household practices.

The Cotonou FSL also yielded policy-relevant insights. Integrating school garden and nutrition education with existing government programmes, such as PNASI, is beneficial and has enhanced the overall impact of the school feeding programme. However, policy support is needed to maintain such complementary initiatives, including funds for schools to maintain gardens and nutritional education. The Cotonou experience suggests that relatively low-cost, community-driven actions can generate significant gains in children's nutritional knowledge and diet quality, although long-term success will require institutionalizing these practices and addressing underlying socio-economic barriers.

4.4.4. Lessons and Insights

The Cotonou case vividly illustrates how food system change can emerge through shifts in everyday practices at the interface of formal institutions and informal community life. The social practices of school gardening, food preparation, and eating at schools are shaped by material tools, competences, and meanings. The Cotonou FSL deliberately targeted these three elements of practice: it altered material arrangements by creating school gardens, providing fresh produce and cooking equipment; it enhanced competences by training children, cooks, and farmers in new skills; and it reshaped meanings by instilling the value of diverse diets and healthy eating in the school community. By doing so, the FSL catalysed a change in the nexus of practices around school food provision and consumption. For example, the simple practice of a child eating lunch at school transformed from passively consuming a monotonous meal to actively recognizing the meal's components and nutritional value and even participating in growing the food in the school garden. This transformation exemplifies how the intervention bridged formal policy and informal community dynamics.

However, maintaining the school gardens requires ongoing resources (seeds, tools, watering) that put pressure on school budgets. There are also issues with watering during dry seasons and occasional theft of produce, issues requiring community vigilance and possibly external support. These observations underscore that knowledge alone is insufficient and that improvements in the school food environment should be complemented by broader poverty alleviation and food affordability measures (WFP, 2022).

Informal community efforts were organised to complement and enhance formal school feeding programmes reflecting principles of self-organisation in urban food systems (Boonstra & Boelens, 2011). Rather than top-down directives, the FSL facilitated a bottom-up process in which teachers, parents, and students co-created solutions, demonstrating community agency and adaptability. In sum, the Cotonou FSL case suggests that meaningful food environment transformations in African cities can arise from interventions that engage with the lived practices of communities. In this peri-urban school setting, sustainable change was co-produced by weaving together formal programmes and informal innovations, thereby contributing to healthier diets and a more resilient local food system.

5. Comparative Analysis

These four FSLs highlight different real-world experiences with food environment transformation in highly dynamic urban food system contexts. All of them focus on improving healthy diets and nutritional outcomes, generally through dietary shifts tending towards natural and plant-based foods (ALVs, legumes, fruits, benefiting health and dietary diversity, but also with positive environmental and resilience outcomes). Transformative changes in food environments are not pre-defined across different localities but represent

different transformative pathways co-developed with stakeholders in different real-world contexts facing specific food system challenges and conditions. In defining and co-developing specific transformative pathways, working with ToC as a tool for reflexive dialogue and defining a shared goal orientation on directions has been key (Blundo Canto et al., 2020).

Building on the ToC-based analysis (see methodological details in 3.2–3.4), each case was translated into a map of activities, outputs, and outcomes, which were subsequently clustered into a cross-contextual logical map (Figure 3). The implemented activities were grouped into common categories (production; market linkages; knowledge/education; governance and advocacy). Analysing the results through a social practice lens, three recurrent pathway logics emerge:

(1) *Production–to–diet pathways*: School or homestead gardening and aquaculture pilots increase the materials available (fresh vegetables and fish), which, when paired with basic skills training, support changes in competences (growing, handling, and cooking) and meanings (valuing diverse and local foods), resulting in higher household or institutional dietary diversity.
(2) *Knowledge–to–behaviour pathways*: Nutritional education (schools, radio, and community sessions) shifts competences and meanings around healthy choices; where affordable options are accessible, these shifts propagate through practice bundles to influence people's purchasing and cooking routines.
(3) *Market/governance–to–access pathways*: Value chain linkages, food safety and governance measures (e.g., canteen hygiene, local ordinances, and inclusive governance on street-food vending), and local food policies alter socio-material and institutional arrangements that shape access (availability, safety, and affordability), enabling healthier choices to be enacted in daily practices.

The cross-case synthesis shows that combinations of these mechanisms underpin progress towards healthier, more sustainable diets. Figure 3 summarises these common impact pathways, derived from the clusters within the case maps. In short, transformative change was co-developed and path-dependent. Progress occurred when shifts in food provisioning, food acquisition, and lifestyle and community practices reinforced one another and when these practice bundles were supported by coordinated actions in production, knowledge, markets, and governance.

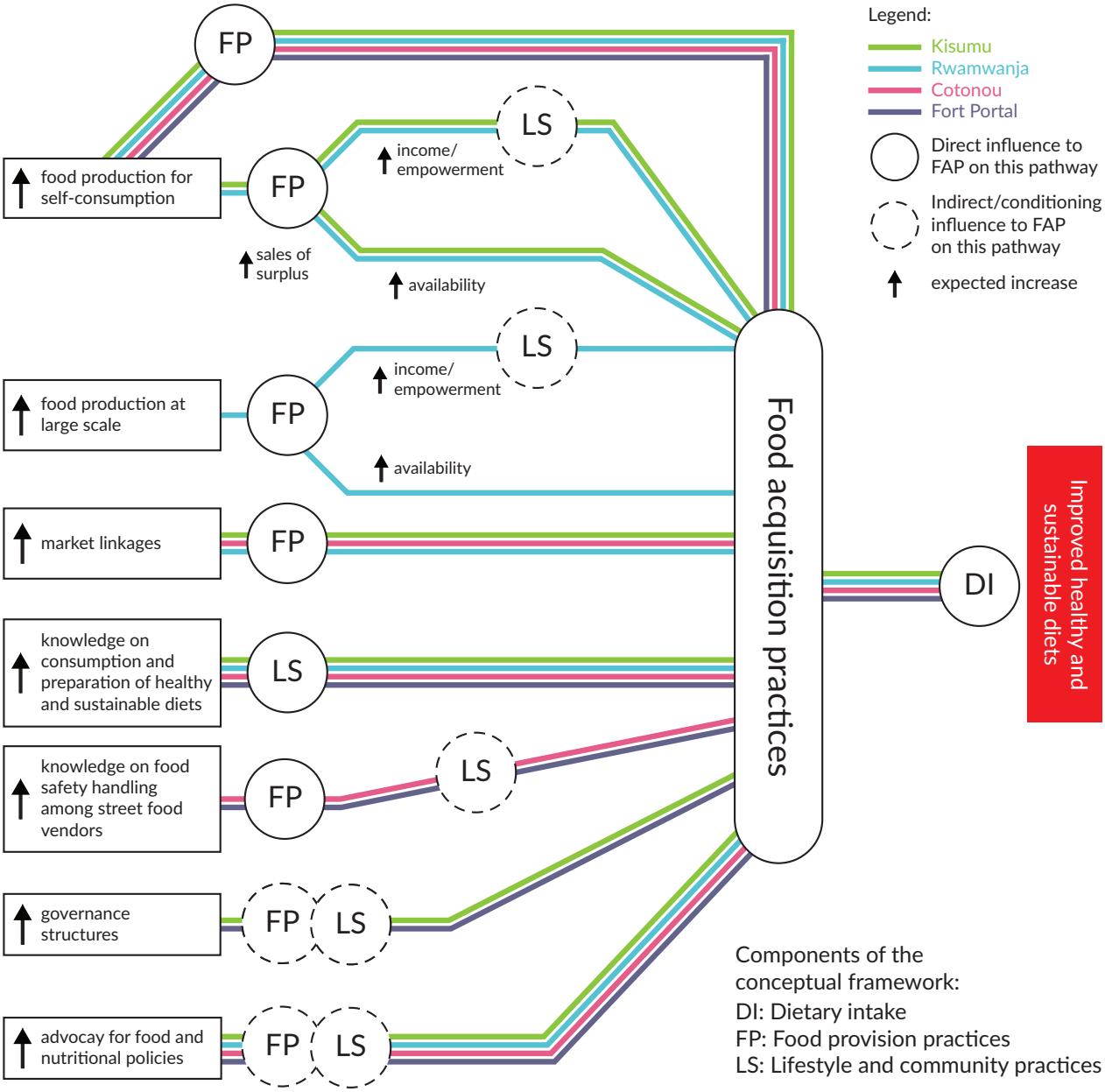

Figure 3. Common impact pathways across FSLs for improved healthy and sustainable diets. Coloured strands trace FSL-specific pathways; nodes mark contributing practice domains (FP, LS, DI). Solid = direct contribution; dashed = indirect/conditioning contribution, consistent with the framework in Figure 1 but applied to this pathway model.

6. Discussion and Conclusion

Insights into how bottom-up living labs, such as FSLs, function can help reframe our understanding of how to enhance food security and nutrition in the face of rapid urbanisation and climate challenges. Their relevance extends beyond nutrition and healthy diets and provides critical insights into the broader mechanisms of governance and the steering of sustainable food system transformations. FSLs operate as "living laboratories" in real-world settings, providing spaces of experimentation for transforming food-related practices and routines. Co-creating and co-developing these models with stakeholders (especially without

leaving urban poor consumers behind) ensures that their lived experiences are taken into account and avoids external interventions being imposed that do not fit local ways of living, routines, preferences, knowledge, etc. This also creates room for flexibility and adjustments where needed, in ways that cannot always be foreseen. Traditional top-down interventions frequently fail in highly dynamic food environments, where informality and self-organisation prevail (Leeuwis et al., 2021; Polese, 2021). A bottom-up approach does not guarantee success; however, it provides space for engagement and empowerment and gives stakeholders the right to try to work out a plan of their own, to fail, learn from it, and improve until it works, or start over from scratch. When there is no room for failure, little that is new can emerge, whereas innovation is urgently needed in Africa's low-income urban areas, where food security and malnutrition challenges continue to expand.

The FSL case studies show that informality is not a barrier but a resource for innovation and resilience. As a design principle, it helps navigate the messiness of urban food environments and the unruliness of food-related practices. For example, informal markets often respond rapidly to local changes in demand, and community networks have the capacity to mobilise and fill gaps in food provisioning, for instance by organising food sharing or offering informal credit during shortages. By embracing the complexity and unpredictability of informal urban food governance mechanisms, these bottom-up efforts may effectively enrich policy frameworks and help bridge the gap between bottom-up experimentation and formal governance structures (Boonstra & Boelens, 2011; Vorley, 2023). FSL experiences have also demonstrated how bottom-up arrangements may interact with traditional top-down institutional policies in productive ways. The implementation of food safety policies for street food vendors and hybrid school food approaches are cases in point. Effective collaboration occurs when top-down institutions recognise the value of local knowledge and the adaptability of bottom-up innovations, allowing both governance modes to intertwine and reinforce each other's strengths in addressing complex urban challenges (Watson, 2014).

Addressing the broad range of food security challenges also requires establishing structural forms of social protection to support the most vulnerable groups, who are barely able to survive within the same systems of informality. In addition, ensuring sufficient supply of adequate, nutritious, and safe food in rapidly growing cities remains a challenge (Battersby & Watson, 2018). This raises questions about the potential for enhancing food safety within informal settlements and improving the efficiency of food distribution by strengthening the self-organising capacities inherent in the informal sector (Vorley, 2023). While informal networks have the capacity to evolve into more structured arrangements, such as associations or cooperatives, this formalisation typically occurs alongside continuous new entries into informality due to persistent structural challenges of poverty, particularly among young people. It is important to recognise that informal food vendors themselves are predominantly urban poor, whose participation in the informal economy largely arises from the necessity to secure their basic livelihoods (Crush & Young, 2019). Enhancing vendors' capacities to self-organise and expand their businesses could potentially generate twofold benefits: improving their economic stability while simultaneously increasing local availability and accessibility of diverse, safe, and nutritious food (Skinner & Haysom, 2016). This aligns with findings from the "Sustainable Healthy Diets through Food Systems Transformation" initiative, demonstrating that strengthened informal supply networks can positively impact both vendors' livelihoods and urban dietary outcomes (Chege et al., 2023).

A more fundamental goal of living labs, such as FSLs, is to promote a shift in mindsets, empowering people and organisations to take action and ownership so that, when the next problem arises, they know how to

identify problems and where and how to seek solutions, instead of waiting for outside solutions to come in. PAR and co-learning effectively support beneficiaries as agents of change, rather than recipients of external aid. Several FSL experiences have demonstrated a capacity for self-organisation as a mechanism for food environment transformation. Another key factor identified in several FSLs is trust, which is crucial among stakeholders to commit and invest their time and energy in developing shared long-term strategies. Yet this trust takes time to build. The short project cycle of research and donor funding expects results and impacts within three to four years. This is often incompatible with the unpredictable dynamics and political complexity of multi-stakeholder processes.

A remaining challenge for researchers is to better capture these small but important "soft changes" and processes, including changes in narratives on the ground and among policymakers. For example, in the case of FSL Kisumu, the county government and stakeholders were initially unfamiliar with a food systems approach, but by the end of the project they were convinced of the need for such an approach, though still puzzled about how to organise and coordinate it at county policy level. This change of heart stems not only from the efforts of the HFA project but also from the interplay of various food system actors and initiatives coinciding in Kisumu. Together, these dynamics make the need for a coherent food system approach even more critical. How can we develop better tools to profoundly understand such incipient transition processes in practices and policies and support them with lessons learnt and effective policy recommendations? Insights from this article and the HFA project more generally indicate some promising avenues, but much more is needed to bring about a paradigm shift in how diet, health, and environmental outcomes can be transformed in highly dynamic food environments.

Finally, it is important to acknowledge the broader political-economic context as a limitation and conditioning factor for bottom-up governance approaches. Structural power imbalances persist, with large industrial players maintaining substantial influence over food system decisions and policy-making processes, often promoting unhealthy diets and unsustainable agricultural practices (Stuckler & Nestle, 2012). While local self-organising efforts can generate valuable grassroots innovations, substantial transformations also require policymakers to enact and enforce robust regulatory frameworks (Swinburn et al., 2019). Experience from Chile demonstrates that strong governmental regulations, such as restrictions on unhealthy food marketing and the introduction of sugar taxes, can significantly reduce non-communicable diseases (Taillie et al., 2020). Therefore, bottom-up innovations must be complemented by advocacy efforts that promote supportive regulatory frameworks and build the necessary political will to achieve lasting structural change.

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Conflict of Interests

The authors declare no conflict of interests.

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Supplementary Material

Supplementary material for this article is available online in the format provided by the authors (unedited).

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Conceptualizing the Digital Food Environment: A Framework

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Abstract

Food environments are important determinants of food choice and consumption and, consequently, drivers of global health and nutrition challenges such as obesity and noncommunicable diseases. These challenges are intensified by the ubiquitous presence of digital technology, which affects food practices. The goal of this study was to develop a middle-range theory for understanding the digital food environment in late modernity. We conducted a critical realist grounded theory study based on elicited data (from semi-structured interviews and observation of digital platforms, tools, and services) and extant data (from interdisciplinary scientific literature). We conceptualize the digital food environment as an augmented space where social and material food practices take place, mediated, enhanced, enabled, or replaced by digital technology, influencing food consumption and impacting nutrition, health, and equity. Our proposed model represents the digital food environment as a socially co-produced space, where the interplay between structure and agency shapes food practices, driven by late modern processes such as digitalization, informationalism, individualization, commercialization, and exposure amplification. The digital food environment has a governance model where technology companies, digital content creators, and non-human agents are key actors, increasing the complexity of food practices and power asymmetries that affect food choice, consumption patterns, and health narratives. Policies to promote healthy food environments must consider their increasingly digitalized nature.

Keywords

artificial intelligence; digitalization; food environment; healthy diets; late modernity; social media; structure and agency

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1. Introduction

Healthy diets are essential for maintaining good health, preventing malnutrition in all its forms, and reducing the risk of several noncommunicable diseases (WHO, 2020). Yet globally, unhealthy diets contribute to high morbidity, mortality, and loss of healthy life years (Afshin et al., 2019). They are also unequally distributed within and across countries, affecting the poorest groups disproportionately (Development Initiatives, 2020; FAO et al., 2024; WHO, 2023b). Disparities in food availability, accessibility, cost, and quality (Blanchard et al., 2024) highlight the importance of addressing the social determinants of health and making food systems more sustainable, resilient, and equitable to support healthy diets (Fanzo et al., 2021).

The food environment is a central concept used to understand the influences on people's access to healthy diets (Swinburn et al., 2011). Unhealthy food environments have been implicated in, for example, the obesity crisis (Hall, 2018; Pineda et al., 2024), though measuring their direct impact on health and nutrition remains a challenge (Hall, 2018; Lytle & Sokol, 2017; Penney et al., 2014). Multiple food environment frameworks have been proposed in the past three decades since Egger and Swinburn (1997) first argued for an ecological approach that considers the wider influences on individuals to better understand the obesity pandemic.

1.1. Current Approaches to the Conceptualization of the Food Environment

There are several approaches to understanding and defining the food environment. For Swinburn et al. (2013, p. 25), the food environment is "the collective physical, economic, policy and sociocultural *surroundings*, *opportunities* and *conditions* that influence people's food and beverage choices and nutritional status" (our emphasis). For Turner et al. (2018, p. 95), it is "the *interface* that mediates people's food acquisition and consumption within the wider food system" (our emphasis). Other definitions have, for instance, described the food environment as the *characteristics related to actual foods* (Herforth & Ahmed, 2015), as the *contexts* related to eating behaviours (Story et al., 2008), as the "*physical environment* that influences an individual's diet" (our emphasis; Backholer et al., 2017, p. 3), or as the "*range of food products and sources* that can be accessed" (our emphasis; Boise et al., 2023, p. 2).

Definitions converge on the idea that food environments are external to individuals and determine dietary behaviours by shaping food choice, while acknowledging the role of individual characteristics. Frameworks typically encompass one or more of the following dimensions: food availability, affordability, accessibility, price, marketing and promotion, desirability, labelling, quality, convenience, and vendor properties (Backholer et al., 2017; Fanzo et al., 2021; Global Panel on Agriculture and Food Systems for Nutrition, 2016; Raza et al., 2020; Turner et al., 2018; van Berkum et al., 2018). Many also emphasize the role of broader sociocultural, economic, and policy influences in shaping these environments (Bennett et al., 2024; Downs et al., 2020; High Level Panel of Experts on Food Security and Nutrition, 2017; Story et al., 2008; Swinburn et al., 2011, 2013). Downs et al. (2020) have highlighted sustainability in their approach, reflecting a recent shift towards integrating planetary health and sustainable diets in food environment research and action. Others such as Glanz et al. (2005), Caspi et al. (2012), and Raza et al. (2020) distinguish between different levels of the food environment, such as the local/community, the consumer/personal, and the organizational levels. More recently, a family food environment model has been proposed (Ambikapathi et al., 2024), as well as a model that distinguishes between wild and cultivated food environments (Downs et al., 2020; Zeitler et al., 2024). The concept of the food environment is sometimes used interchangeably with the concept of foodscapes (MacKendrick, 2014;

Vonthron et al., 2020), though the linkage with health and nutrition outcomes is not always present or evident in foodscape research.

Overall, research on the food environment has largely prioritized its physical dimensions (Cifuentes & Sonnino, 2024), with limited attention to the theoretical exploration of this phenomenon, though its need has been recognized (Turner et al., 2017). Recent contributions to this theoretical development include the conceptualization of food environments as assemblages, developed by Cifuentes and Sonnino (2024), highlighting their dynamic and transformational nature. From an assemblages perspective, the food environment is "a dynamic place, which comprises heterogeneous (mobile and fixed) components," which are "assembled to serve its purpose(s)—which, so far, has narrowly been described as the availability and accessibility of desirable foods" (Cifuentes & Sonnino, 2024, p. 4). Further, Mattioni et al. (2020) proposed a sociological approach to food environments, in which the need to better integrate the sociocultural understandings of food and food practices emerges. Rather than neutral places where physical transactions with food occur (i.e., food purchase), they argue that retail outlets are cultural intermediaries that transmit notions of food that have implications for diets (e.g., what counts as food, notions of healthiness), with social food practices mediating how people interact with the food environment (Mattioni et al., 2020).

Indeed, framing food practices within the food environment as social practices enables a better understanding of the dynamic relationship between the social context (structures) and people's everyday actions (agency), providing a conceptual lens for exploring the underlying social relations that connect individuals in society and determine dietary patterns (Delormier et al., 2009). Understanding the interplay between structure and agency is essential, as food environments are not passive, static contexts, but rather continually and actively shaped by the social practices of individuals, groups, and organizations. As described by Cifuentes and Sonnino (2024), food environments are not simply the background against people's lives. At the same time, there is overwhelming evidence that powerful structures shape nutrition, health, and equity outcomes. The commercial determinants of health, which refer to the systems, practices, and pathways through which commercial actors impact population health by influencing societal norms and values, policies, economies, and behaviours in favour of profit (Gilmore et al., 2023), illustrate the power of such social structures. Commercial actors in the food environment exert considerable influence over what diets are attainable, as evidenced by the global rise in sales and consumption of unhealthy, ultraprocessed foods (Baker et al., 2020; Monteiro et al., 2013; Moodie et al., 2021), despite evidence of their health harms (Chen et al., 2020; Lane et al., 2024; Pagliai et al., 2021).

Conceptualizing food environments as contingent, relational, and active spaces emphasizes their dynamic nature and susceptibility to transformation in the context of broader societal change, as that brought by late modernity.

1.2. Food Environment Transformations in Late Modernity

Late modernity refers to the period of societal development from the mid-20th century to the present, marked by profoundly transformative processes. One such process is globalization, which increases the interconnectedness of economies and cultures, making information and communication more central to society, fostering interdependence, and bringing distant events closer to people's daily lives (Giddens, 1990). Late modernity is also characterized by increased reflexivity, as individuals find themselves reevaluating and

adapting their identities, beliefs, and lifestyles in response to the availability of information and rapid social change that characterizes a more fluid, "liquid" society (Archer, 2012; Bauman, 2000; Beck & Beck-Gernsheim, 2002; Giddens, 1991). This encourages a continuous process of self-identity formation and improvement, promoting individualization rather than collective societal arrangements (Beck & Beck-Gernsheim, 2002; Giddens, 1991). Underpinned by neoliberal ideology, these processes reframe health as a matter of personal responsibility, shifting the burden of ill health to individuals rather than considering the weight of the broader determinants of health and equity, thus downplaying the role of the state in supporting healthy environments (De Souza, 2011; Dutta, 2015).

Another central feature of late modernity is the extended reach of science and information through advancements in digital technology (Brossard, 2013; Castree et al., 2013). While these developments contribute to the democratization of knowledge, they also expose deep inequalities in access. The digital divide limits the ability of marginalized populations to fully participate in and benefit from the digitalization of society (Lythreatis et al., 2022). Consequently, rather than universally empowering individuals, digital advancements can reinforce existing socioeconomic disparities (Crawford & Serhal, 2020). Additionally, expert knowledge is more widely available and continuously revised and scrutinized, allowing a pluralism of expertise (Giddens, 1990). This contributes to the erosion of traditional scientific authority, creating vulnerabilities such as widespread misinformation in a world where digital literacy remains a challenge (Borges do Nascimento et al., 2022; Denniss & Lindberg, 2025; Estrela et al., 2023; Smith & Magnani, 2019; Suarez-Lledo & Alvarez-Galvez, 2021; Swire-Thompson & Lazer, 2020; Tsao et al., 2021).

These late modern processes have implications for food environments. For instance, globalization has altered the profile of foods available in the food environment, in terms of quantity, type, and cost, bringing closer diets that used to be distant, thus broadening the scope of individual food choice, at least in theory (Fonte, 2021; Hawkes, 2006). Furthermore, people may reevaluate and adapt their diets having been influenced by social media content and digital marketing (Boyland et al., 2022; Hawkins et al., 2020). The ubiquity of health and nutrition misinformation is also part of this context, undermining trust in official health advice and promoting anxiety and uncertainty about diets (Diekman et al., 2023; Jackson, 2010; Nagler, 2014; Östberg, 2003; Vijaykumar et al., 2021). In short, the food environment has become a much more complex landscape to understand and conceptualize.

Digital technology is increasingly integrated into every aspect of life, with growing recognition of the digital determinants of health and equity (Chidambaram et al., 2024; Holly et al., 2025; Kickbusch & Holly, 2023; Richardson et al., 2022; Tefera et al., 2025). As digital technologies become embedded in our daily activities, they create new patterns, routines, interactions, and spatial configurations (Franklin, 2015). Digitalization affects the different dimensions of the food environment (Granheim et al., 2021), from online food retail to meal delivery smartphone apps and digital food marketing (Bennett et al., 2024; S. S. Jia et al., 2025). However, the digital dimension is often underrepresented or absent in existing food environment frameworks.

The *digital food environment* is an emergent concept in scientific literature, with initial efforts at conceptualization appearing since 2019 (Bennett et al., 2024; Cong et al., 2025; Granheim, 2019; WHO EURO, 2021a). It has been described as the "online aspects of the modern food environment" (Bennett et al., 2024, p. 2) and as "online settings through which flows of services and information that influence people's food and nutrition choices and behaviour are directed" (WHO EURO, 2021a, p. 1). A tentative conceptual

framework was proposed by Granheim (2019), indicating digital activities, digital settings, and digital actors that comprise the digital food environment. Cong et al. (2025) developed a conceptual framework for food environments and food systems that take digital platforms into account, while De Castro and Canella (2022, p. 6) included "virtual surroundings" as part of their conceptual model on organizational food environments. Nevertheless, these conceptual models remain preliminary and insufficiently grounded in social theory, limiting their explanatory power and ability to account for the complex effects of digitalization on food environments. Thus, further theorization of the digital food environment as a social phenomenon in the context of late modernity is warranted.

Therefore, the main goal of this study was to develop a theoretical framework for understanding the digital food environment in the context of late modernity, as a step towards more theory-informed food environment studies. It acknowledges and builds upon decades of global scholarship across several fields of knowledge that have conceptualized and advanced the notion of food environment, aiming to further extend this body of work by accounting for the process of digitalization. We propose a definition and a theoretical framework for the digital food environment that is empirically grounded and informed by social theory, thus offering an ontological foundation for its continued investigation.

2. Methods

This study employed a critical realist grounded theory approach to develop a middle-range theory on the digital food environment (Kempster & Parry, 2011; Looker et al., 2021; Oliver, 2011). Given that grounded theory methodology is still underdeveloped within a critical realist framework, the study was heavily informed by other traditions, in particular, the work of Charmaz (2014) and Corbin and Strauss (2015). Middle-range theories are positioned between formal theories, which are more general, and substantive theories, which are specific and more common in grounded theory research. Unlike substantive theories, middle-range theories are not tied to a specific context or population group, but aim for broader applicability, without seeking to create an all-encompassing, unified social theory (Merton, 1968). Our goal was to develop a middle-range theory on the digital food environment as an overarching framework with potential applicability across different contexts, without claims of universality or infallibility.

In line with a grounded theory approach, data collection and analysis were conducted iteratively and concurrently over the course of the study, which took place between 2019 and 2025. Our proposed middle-range theory is grounded in the analysis of elicited and extant data. The combination of multiple sources of data is supported by the basic grounded theory premise that "all is data" (Glaser, 1998, p. 8). Having different "slices of data" (Glaser & Strauss, 1999, p. 65) contributes to a richer understanding of the phenomenon studied, allowing the creation of new codes and categories and helping to describe their properties in ways that elicited data (interviews) alone could not achieve.

Extant data were collected in the form of published research articles related to the food environment and digitalization. In the case of interdisciplinary studies, scientific literature is particularly useful as data in grounded theory, as it helps integrate insights from multiple disciplines on a given phenomenon (Paterson et al., 2001). It is also necessary when theorizing beyond substantive theories (Glaser & Strauss, 1999; Martin, 2019). Extant data were initially collected through an interdisciplinary systematic scoping review of the literature, which analysed 357 studies published between 2000 and 2019 (see Granheim et al., 2021 for

detailed methodology and results). This was supplemented by ongoing theoretical sampling of emerging academic studies and grey literature throughout the course of this study. This allowed for the existing body of knowledge regarding digitalization of food environments to constitute a core part of middle-range theory building. The scoping review also supported the development of sensitizing concepts (G. A. Bowen, 2006) that informed a semi-structured interview guide used as a starting point for the collection of elicited data.

Elicited data were collected through semi-structured interviews with young women aged 18–25 years in Norway (n = 14), as well as theoretically sampled secondary materials mentioned during interviews (e.g., websites, food-related smartphone apps, and social media influencer channels and their content). Young women were deemed a relevant group for exploring the influence of digitalization on food-related practices due to their high engagement with digital media and increased vulnerability to social media representations of diet and body image (Brasil et al., 2024; Dane & Bhatia, 2023; Lupton, 2017a; Statistics Norway, 2024). The intergenerational impact of nutritional status among women of reproductive age is well-established in the literature, and women continue to bear the primary responsibility for food-related tasks at home, in Nordic countries and elsewhere (S. Bowen, 2021; Stephenson et al., 2018; Storz et al., 2022). The age group of 18 to 25 years was chosen as it represents a transitional phase into adulthood, with changes in residence, employment, and social relationships, as well as increasing autonomy regarding food choices, making them more active participants in their food environment.

Young women were purposively sampled both in person and online, through acquaintance referrals, social media, emails, and leaflets distributed to youth organizations, public services, and universities. They were asked about their use of digital technology in food-related activities such as food purchase, meal planning, and seeking nutrition and health information. The elicited data from the young women informed the development of a substantive theory on the digitalization of food environments in Norway (see Granheim et al., 2025 for detailed methodology and results), which served as a foundational component in the development of the middle-range theory presented in this article.

Interviews were transcribed verbatim and coded line-by-line (Charmaz, 2014) in NVivo. Memos documented the observations from secondary elicited materials. The scoping review charting table and selected studies were used to generate additional codes. As the data gathering and coding process developed, codes were clustered into categories, which were then used to build core categories. Following the constant comparative method of grounded theory, memoing and diagramming were employed throughout the analysis to capture initial analyses, refine developing ideas, and enable comparisons and conceptual relationships, thereby supporting the progression of the analysis beyond a descriptive account towards greater theoretical abstraction (Charmaz, 2014; Corbin & Strauss, 2015). Recruitment ended when interviews no longer yielded new insights that significantly advanced the developing theory, indicating that theoretical saturation had been reached. Theoretical saturation was not fully reached for extant data, since the interdisciplinary nature of the digital food environment and the rapid technological changes constantly taking place ultimately mean that new processes and categories will continually emerge. As argued by Saunders et al. (2018), however, theoretical saturation should align with the research questions, and there should be some limit to its scope, in order to avoid stretching the study too widely and risk losing coherence and depth.

The analysis and theory-building process was underpinned by critical realism as a meta-theoretical framework, drawing on Bhaskar's (1975) transformational model of social activity (TMSA). According to the

TMSA, social life is ontologically constituted of four interrelated dimensions: social structures, human agency, social interactions between people, and material transactions. Within this framework, social structures simultaneously enable and constrain agency, while agents, through their actions and interactions, reproduce or transform those same social structures (Bhaskar, 2016). The TMSA served as an ontological lens for our analysis as we examined codes, categories, and core categories in relation to the four dimensions of the TMSA and developed a definition and theoretical model of the digital food environment that reflect this ontological understanding of social reality.

The constant comparative method of grounded theory applied in this study involved abductive/retroductive reasoning. Abduction is not an exact technique but rather an intellectual process of discovery that involves iterative interpretation and testing of explanations to reach a plausible theoretical interpretation of the empirical data (Reichertz, 2007). Following Charmaz (2014), we began by examining data inductively to develop codes and categories, which were compared and appraised in relation to each other, and, in relation to relevant social theories that address late modernity, to develop a plausible theory with strong explanatory power. Abductive reasoning overlaps with the logic of retroductive reasoning in critical realism, with Bhaskar (2016) noting only a relative distinction between the two. While abduction focuses on interpreting empirical data to generate plausible theoretical explanations, retroduction goes a step further by seeking to logically infer the underlying conditions causing the empirical observations to occur. Thus, retroduction supports the identification of what critical realists have termed generative mechanisms (Bhaskar, 1986, 2016; Buch-Hansen & Nielsen, 2020; Danermark et al., 2019). Our approach was mostly abductive, through iterative engagement with empirical data and existing theory, with the retroductive questioning of the data used sparsely. Nevertheless, retroductive reasoning supported the abstraction process necessary for developing our middle-range theory, enabling us to infer broader societal processes that act as drivers of the digital food environment in the context of late modernity. These processes can be understood as the generative mechanisms shaping the digital food environment in the form and dynamics that we observed and interpreted.

The following example illustrates how our different sources of data were integrated through abductive/retroductive reasoning during the analysis. Interviews with young women revealed a narrative of self-optimization, reflected in practices such as using smartphone apps to track diets and tailor them to personal health-related goals, alongside exposure to algorithmically personalized food-related content on social media (see Granheim et al., 2025). Individually tailored features, such as personalized price promotions and discounts, were also observed in the digital tools and platforms that they reported using and which we analysed. Additional evidence from scientific literature identified a range of strategies through which digital food marketing leverages personalization, for instance with artificial intelligence (AI) employed to optimize engagement and individual targeting. Through iterative comparison of codes across data sources, the category “personalization and tailoring to individuals” was developed. We inferred the existence of a broader underlying process, individualization, as a potential generative mechanism shaping the digital food environment and fostering the personalization and individual tailoring that we observed. To further interrogate this interpretation, we consulted relevant social theorists of late modernity and identified that some, such as Beck and Beck-Gernsheim (2002), have theorized individualization, which helped us contextualize and refine our interpretation. We then assessed whether our developing theorization accounted for the observations from elicited and extant data, and found that it provided a coherent explanatory framework, thus warranting inclusion in the final theoretical framework.

3. Findings and Discussion

3.1. Defining the Digital Food Environment

Our analysis of elicited and extant data indicated that digital technology has become profoundly embedded in food environments in late modernity, shaping their configuration and functioning. We define the digital food environment as an augmented space where social and material food practices take place, mediated, enhanced, enabled, or replaced by digital technology, influencing food consumption and impacting nutrition, health, and equity. Figure 1 presents a visual representation of this definition.

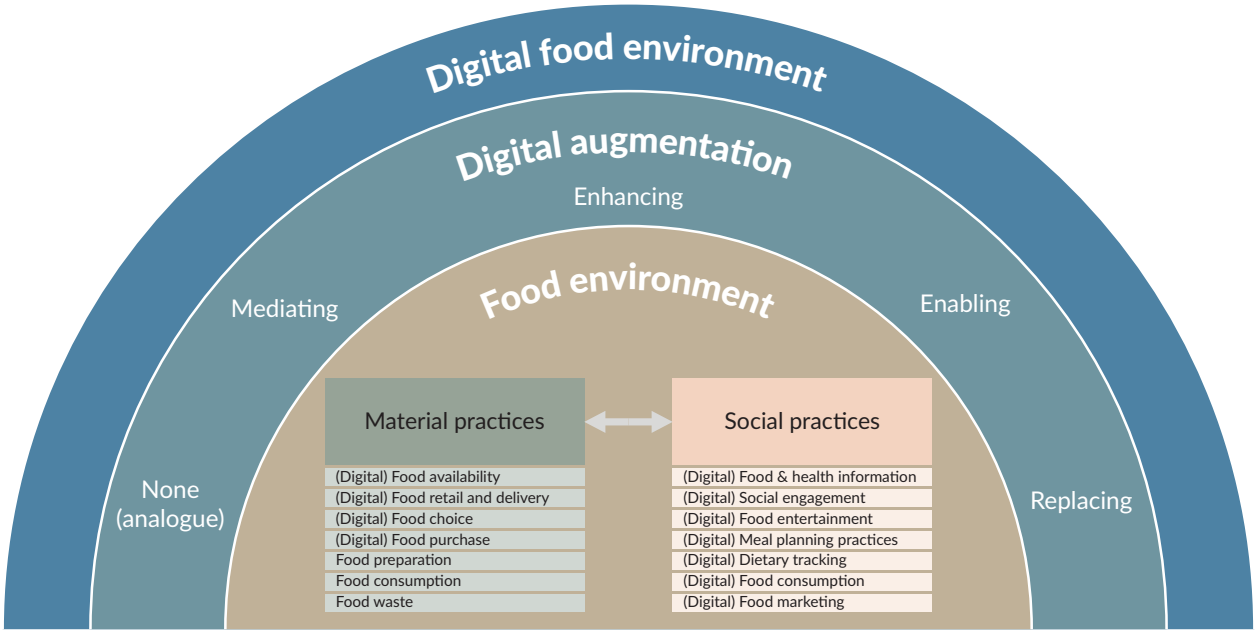

Figure 1. A visual representation of the definition of the digital food environment.

This definition is intentionally constructed to convey certain notions. First, and building on Henri Lefebvre's theory of space (Lefebvre, 1991), it frames the digital food environment as a *socially co-produced space*. This acknowledges that digital food environments are not naturally occurring phenomena, but rather a product of collective action, shaped in the dynamic interplay between social structures and agency. The digital food environment itself functions as a social structure that is shaped by the food practices enacted within it (agency) and, in turn, shapes those very practices, for instance by constraining or enabling healthy food choices, thus impacting directly and indirectly on nutrition, health, and equity.

More than static external contexts, interfaces, or physical settings where food is available, affordable, and purchased, digital food environments are conceptualized here as dynamic spaces where social and material food practices are enacted. This encompasses both physical and social dimensions of food, which are interconnected, inseparable, and of equal significance. For this reason, and aligned with critical realist ontology (Bhaskar, 1975, 2016), material and social food practices are depicted with equal prominence in the visual representations we constructed (Figures 1–3). This perspective contrasts with existing models of the food environment that tend to emphasize material aspects (Downs et al., 2020; Raza et al., 2020; Turner et al., 2018). Material food practices refer to the interaction with food as a tangible object, which can be

chosen, touched, prepared, exchanged, gifted, donated, purchased, transported, consumed, or discarded. Social food practices, on the other hand, extend beyond the material domain, encompassing the ways in which individuals engage with each other about food, how meals are shared, and how food is understood, desired, idealized, demonized, and promoted in society. The model presented in Figure 1 depicts the primary material and social food practices identified in this study.

Second, the digital food environment is conceptualized as an *augmented* space because it represents an expansion of the experiences, characteristics, functionality, and opportunities of analogue food environments through the use of digital technology. Material and social food practices can occur independently of digital technology but may also be digitally augmented to varying degrees. We represent this digital augmentation through five overlapping and interwoven levels: analogue, mediating, enhancing, enabling, and replacing. The inclusion of the first level, *analogue* (no digital augmentation), indicates that social and material food practices can still occur in analogue form even in highly digitalized societies.

Digitally mediated food practices refer to a level of augmentation where digital technology acts as an intermediary, a mediator for a transaction without fundamentally changing its character. This can be observed, for instance, in food purchases where the payment occurs digitally, but digital technology plays no other role in the decision-making and purchase processes.

Digitally enhanced food practices refer to a further level of augmentation, in which digital technology fundamentally changes the experience, physical spaces, or services by adding transformative features. For example, meal delivery apps are not a neutral mediator in the food purchase transaction. They have features such as push notifications, discounts, and user interfaces that are designed to promote and increase the frequency of purchase, shaping the types of meals purchased towards energy-dense foods of low nutritional quality (Bennett et al., 2024; Brar & Minaker, 2021; Fernandez & Raine, 2021; WHO EURO, 2021b). Other examples include meal subscription kits, online food retail, and digital ordering kiosks in physical restaurants.

Digitally enabled food practices have a level of augmentation where digital technology allows the existence of products, services, and interactions that have no materiality and exist purely as digital data, thus pertaining to practices occurring in cyberspace. Cyberspace refers to the medium created by computer networks such as the internet, where online communication, data exchange, and social networking occur, including digital settings such as social media platforms, websites, chat rooms, etc. (Castree et al., 2013; Dodge & Kitchin, 2001). Though supported by material technology infrastructure, digitally enabled food practices are immaterial and largely online. In focusing on online settings, existing digital food environment definitions (Bennett et al., 2024; WHO EURO, 2021a) align best with this level of digitalization, but insufficiently accommodate the additional dimensions proposed in our framework. An example of digitally enabled practices is food and nutrition-related support groups and communities in social media platforms, which create a social environment that does not necessarily exist outside of cyberspace (Giacoman et al., 2024; Jacobsen et al., 2017; Marcon et al., 2018; Pham et al., 2024; Supthanasup et al., 2021). Another example is the emergence of digital food influencers, often understood as "food celebrities" who communicate about food online, reaching broad and diverse audiences (Goodman & Jaworska, 2020, p. 184), whose very existence is only possible due to digital technology.

Digitally replaced food practices refer to those where digital technology displaces human transactions in the digital food environment, as human choices and activities are outsourced to non-human agents. The growing adoption of AI illustrates this, for instance, in AI analysis of consumer behaviour for autonomous targeting of digital food advertisement (Baek, 2023; Gao et al., 2023).

Third, impacts on nutrition, health, and equity are deliberately prioritized in the definition, reflecting the body of evidence linking these issues and recognizing that digitalization can contribute to widening social inequalities (Kickbusch et al., 2021). Moreover, the definition is intentionally non-directional with respect to outcomes, acknowledging that the digitalization of food environments has the potential to generate both beneficial and detrimental outcomes.

Finally, given that the digital food environment is socially co-*produced* (and therefore a social *product*; Lefebvre, 1991), each society, group, or individual *produces their own* digital food environment. Consequently, multiple digital food environments coexist, co-produced across various scales, and can be investigated at different levels of analysis. The issue of scale can be approached from different perspectives and epistemological traditions (Manson, 2008). In our analysis, we integrate elements from Bhaskar's seven-scalar laminated system (Bhaskar et al., 2017) and Bronfenbrenner's socio-ecological theory (Bronfenbrenner, 1977) to propose a stratification of scale in the digital food environment, which is itself represented here as a meso-level phenomenon (Figure 2).

The different layers of the model in Figure 2 are fluid, mutually constitutive, and influence each other (indicated by the arrow at the bottom left corner). The representation of fluidity is a limitation of this type of model, although it remains a useful and familiar tool for illustrating different scales and levels of complexity. While social and material food practices may be approached at the individual level, as implied in the model, they may equally be approached from an institutional perspective. Although the digital architecture is depicted

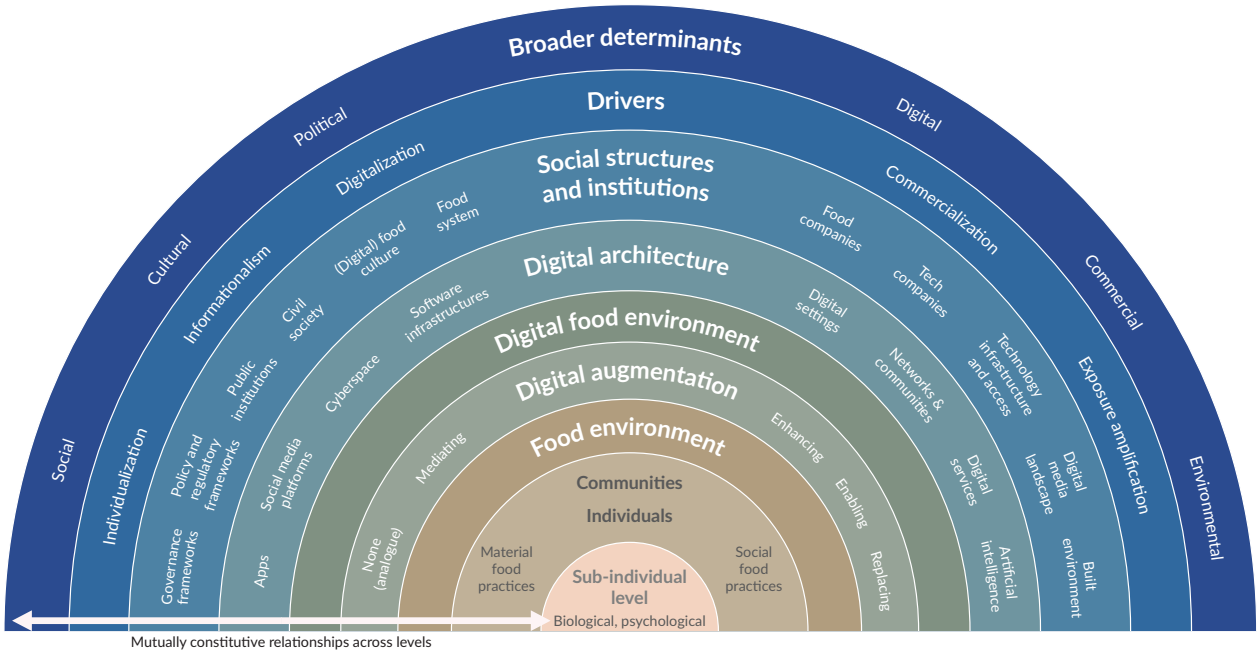

Figure 2. Levels of scale in the digital food environment.

as encapsulating the lower levels of the model, it simultaneously influences the upper levels. Additionally, the model in Figure 2 portrays levels of scale, but may inadvertently suggest that digital and analogue food environments can be separated. We argue, however, that it is impossible to fully disentangle the digital and analogue dimensions of the food environment in late modernity.

3.2. A Proposed Ontology for the Digital Food Environment

Our proposed ontology for the digital food environment is portrayed in Figure 3 following the realist Context–Mechanism–Outcome configuration (Pawson & Tilley, 1997). In our conceptualization, the digital food environment is ontologically positioned as a social structure that is co-produced in the interplay between different domains: (i) *agents* (human and non-human), who (ii) perform *social and material food practices*, which can be (iii) *digitally augmented* to varying degrees, and (iv) shape and are shaped by existing *social structures*, which in turn (v) exist in the context of *broader determinants* of health and equity. These interacting domains, illustrated through nested levels at the centre of Figure 3, are driven by *late modern processes*, and have a number of *outcomes* in relation to nutrition, health, equity, human rights, and the environment, which in turn feed back into all domains.

Over time, these domains and processes interact in a complex and interdependent dynamic, as human and non-human agents reproduce or transform the shape and character of digital food environments through their presence and activity, while simultaneously being enabled or constrained by social structures (including the digital food environment itself) and broader determinants. The arrows at the top right corner indicate the bi-directional flow between all components situated within these nested levels.

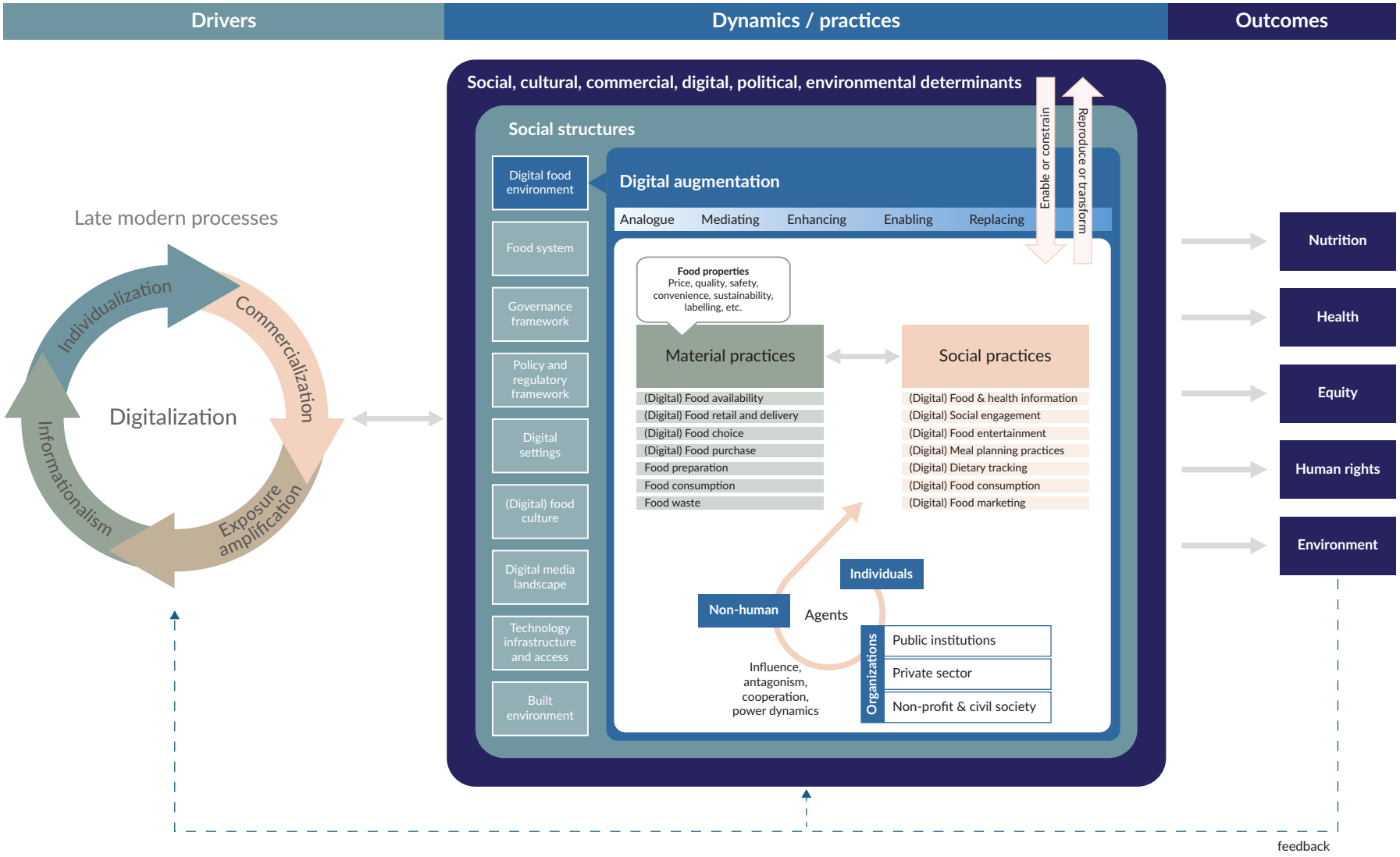

Figure 3. Ontological model of the digital food environment.

3.2.1. Agency in the Digital Food Environment

The digital food environment is socially co-produced over time in the interplay between the different actors who constitute it. In our proposed typology, we consider both human and non-human agents, each possessing distinct properties and characteristics, as illustrated in Figure 4. These properties are not fixed attributes, but rather dynamic elements which can be restructured over time, for instance towards more equitable outcomes (Graham, 2007).

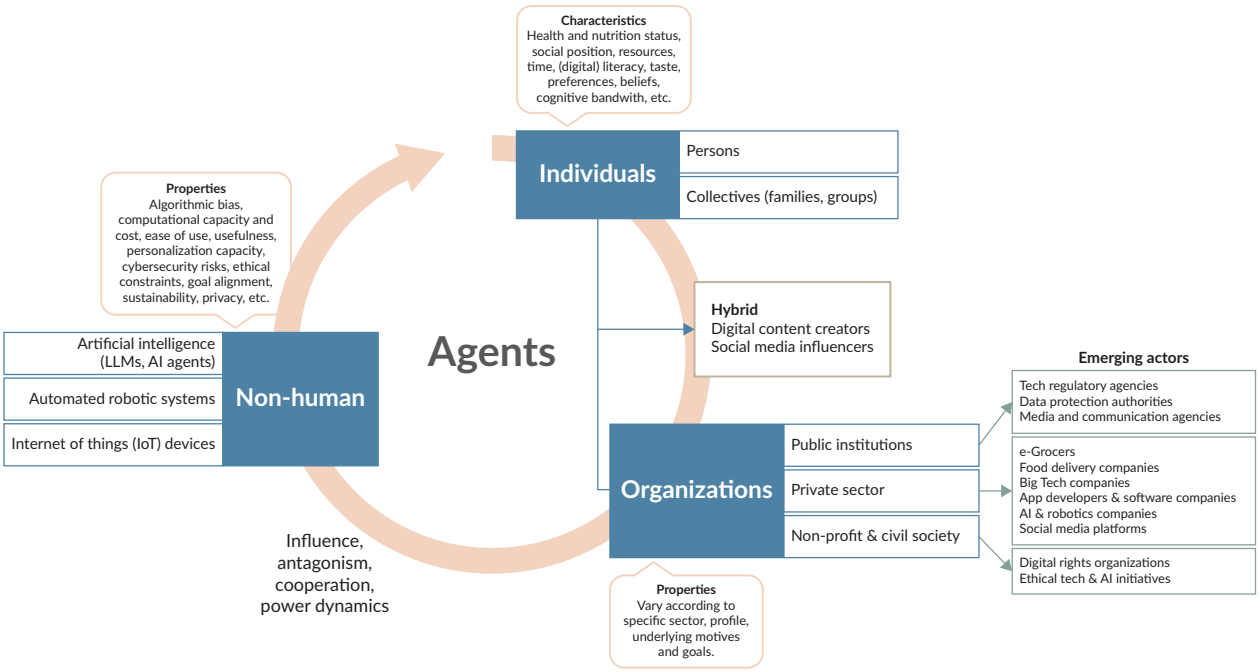

Figure 4. Typology of agents in the digital food environment. Note: Traditional food environment actors such as the food industry, food retailers, as well as governments and regulatory bodies in all sectors directly and indirectly related to food and health are omitted from this model for simplification purposes but are also part of the digital food environment governance.

Human agents refer to individuals as well as different types of human organizations. This includes the traditional actors in food environment governance, such as consumers, the food industry, food retailers, the advertising industry, governments and regulatory bodies, academic and research institutions, and civil society organizations (Kraak & Niewolny, 2024; Lobstein et al., 2013; Sacks et al., 2019). Food environments are, however, contested spaces with significant power asymmetries, particularly between the public and private sectors, where public health goals often conflict with the profit-oriented interests of commercial and quasi-commercial entities (Lacy-Nichols et al., 2023; Mialon et al., 2015; Moodie et al., 2021).

In the digital food environment, these complexities are amplified by technology companies, which have become integral to food environment governance. These actors create, provide, and enable food-related digital services, such as food delivery apps and aggregators (Traynor et al., 2022), dark/ghost kitchens (Hakim et al., 2023; Nigro et al., 2023), digital food marketing, and online food retail (e-Grocers). They have also contributed to the transformation of food into a digital commodity, understood as "an intangible product produced for profit but one that exists only in the electronic domain of bits and bytes" (Rotta &

Paraná, 2022, p. 1046). *Digital food commodities* encompass a wide range of products, from food imagery on social media (Ibrahim, 2015) to diet-tracking apps (Griffiths et al., 2018).

Technology companies include the major multinational technology corporations such as Alphabet, Meta, and Amazon ("Big Tech"), alongside app developers, AI companies, and social media platforms. They function as gatekeepers of digital food and nutrition information, with the power to either facilitate or hinder the dissemination of health- and nutrition-related (mis)information (Storeng & Puyvallée, 2021). They also provide the digital infrastructure through which user data are collected and leveraged for targeted digital food marketing, while enabling the rise of social media influencers (Abidin, 2016; Goodman & Jaworska, 2020; Miguel et al., 2024) as key actors in the digital food environment.

In our conceptualization, social media influencers and other digital content creators are a hybrid category of agents, given that they may act in a personal capacity but often operate as commercial entities rather than private individuals. They act as knowledge brokers, curators of information for the general public, and make food into entertaining content to be consumed (Granheim et al., 2025). Their action influences and shapes food culture, consumption habits, and the flow of narratives about food, nutrition, and health (Vilkaite-Vaitone, 2024). They have also become key figures in digital food marketing (Coates et al., 2019; Evans et al., 2024).

Furthermore, non-human agents are increasingly part of the digital food environment. The sociological understanding of non-humans as agents is not new (Latour, 2005; Lupton, 2017b). In our analysis, we identified the action of non-humans in the digital food environment, for instance, in the form of recommendation algorithms that shape social media feeds with digital food content curated and tailored for the individual (Bhandari & Bimo, 2022; Hermann, 2022), and in programmatic advertising through which the process of buying digital advertisement placements is automated, based on an individual's personal data (Nair & Gupta, 2021). In both these cases, the algorithms are responsible for deciding what digital content individuals will be exposed to, though generally guided by parameters provided by humans.

Non-human agency has recently become a more pressing issue due to advancements in generative AI, including large language models (LLMs) such as ChatGPT, which have become easily accessible and affordable to individual users. Although this field is new and rapidly developing, emerging evidence suggests that such technologies are currently being used to generate personalized meal plans and recipes based on user input and characteristics (Papastratis et al., 2024), as well as to provide nutrition information and dietary advice (Bayram & Ozturkcan, 2024; Niszczota & Rybicka, 2023; Ponzo et al., 2024). We have also observed the use of generative AI to create digital food content in social media, including recipes, food videos, and advertisements. Emergent forms of AI, such as AI agents (a more advanced form of LLMs), are capable of making decisions and taking actions on behalf of humans even in the absence of explicit instruction sets from a human (Gutowska, 2024; Wiesinger et al., 2024). Agentic AI has the potential to fully displace human agency in key aspects of an individual's interactions with food, including determining what to eat, planning meals, and purchasing food. These examples suggest ways in which important food-related choices can be outsourced to AI, thus replacing human agency, although the reach of this application and the outcomes for health, nutrition, and equity remain unknown.

Thus, the digital food environment has a governance model in which technology companies, digital content creators, and non-humans have become key actors, enabling new, more sophisticated ways to shape consumer

behaviour, preferences, and purchases. The existence of a new governance model is corroborated by emerging research that increasingly recognizes the social media industry and digital media as commercial determinants of health (Even et al., 2024; Kenworthy et al., 2023; Lafontaine et al., 2025; Zenone et al., 2022).

3.2.2. Social Structures and Broader Social Determinants

Social structures generally refer to patterns of social relationships, roles, rules, and institutions that contribute to social order and cohesion, structuring individual and collective behaviour (Buch-Hansen & Nielsen, 2020; Giddens, 1984; Porpora, 2015). According to Bhaskar (2016), structures pre-date agency, yet they are reproduced or transformed through agency over time. We presented a number of social structures in Figure 3. The digital food environment itself is ontologically positioned as a social structure, which enables or constrains digitally augmented social and material food practices. For instance, the ordering of unhealthy meals is facilitated by meal delivery apps, where their presence is prominent by design, and persuasive digital marketing strategies are employed to promote sales.

Other social structures play a role in shaping the digital food environment and food practices. The food system is a social structure that links the digital food environment with the broader dynamics of food production systems that affect food availability, quality, sustainability, and price (Global Panel on Agriculture and Food Systems for Nutrition, 2016; van Berkum et al., 2018). Further, a precondition for the existence of the digital food environment is availability, affordability, and access to digital technology infrastructures and services. The degree to which a society is digitalized more generally will impact the degree of digitalization of the food environment.

Governance frameworks structure the organization and interaction of institutions by defining processes, roles, and responsibilities, while simultaneously being shaped by underlying power dynamics that influence their functioning and regulatory capacity. Within this context, existing policy and regulatory frameworks, as well as those that are lacking, constitute a critical social structure by establishing the rules governing agents that engage in digitally augmented social and material food practices. Regulation in the digital food environment presents new challenges. For example, digital food marketing has raised new concerns given its presence across national borders, the rapid evolution of marketing strategies driven by algorithmic personalization, and the blurred boundaries between user-generated and commercial digital content (e.g., influencer marketing; WHO, 2023a; WHO EURO, 2016). Although recent regulatory initiatives such as the introduction of food labelling standards for online food vendors (Joint FAO/WHO Codex Alimentarius Commission, 2024) represent progress, existing regulatory frameworks are likely to be insufficient to address the complexity and fluidity of the digital food environment.

Other key social structures are the digital media landscape, the built environment, the broader food culture, including the specificities of digital food culture, and digital settings. We understand *digital settings* as the places in cyberspace where people engage in their daily activities and interact with the digital food environment. This includes the different social media platforms (e.g., Facebook, TikTok, Instagram, Snapchat), chatrooms and messaging apps (e.g., WhatsApp, Messenger), websites, online supermarkets and other digital food vendors, food sharing platforms, online communities and forums (e.g., Discord, Reddit, Facebook groups), mobile health and nutrition apps (e.g., MyFitnessPal, Lifesum), content streaming platforms (e.g., YouTube, Twitch), among others.

In Figure 3, we depict social structures as taking place in the context of broader social, cultural, commercial, political, environmental, and digital determinants of health and equity, which have been extensively described in the literature (Dawes et al., 2022; Gilmore et al., 2023; Kickbusch & Holly, 2023; Marmot et al., 2010; Paltriguera et al., 2024; Rice & Liamputtong, 2023). Although there may not be a strict ontological distinction between social structures and social determinants, we opted to present them separately in the model for greater analytical clarity. This distinction makes it possible to highlight the key structural forces that directly shape the digital food environment, while also acknowledging the wider determinants (such as health systems, health promotion interventions, climate change, among others) that influence it more broadly but fall outside the scope of this study.

3.2.3. Late Modern Processes Driving the Digital Food Environment

This section describes the late modern processes that we identified as the major drivers of the digital food environment. Our theoretical framework in Figure 3 reflects a temporally situated configuration of the digital food environment, shaped by these processes. It does not represent a static or definitive model, but rather one contingent on the dynamics currently observed. Therefore, different societal processes may shape a different configuration for the digital food environment, for instance, at a different point in time or at a specific level of scale.

These drivers are portrayed in the left circle in Figure 3, with the process of *digitalization* placed at the centre of the circle, reflecting its dual influence both as a driver of the digital food environment and as a process affecting all other drivers. The recurrence of digital/digitalization/digital augmentation in different places of the model in Figure 3 may appear redundant but is intended to show how deeply embedded digital technology is at all levels, representing a cross-cutting process that permeates the entire system.

Digitalization is intrinsically tied to the production, processing, and circulation of information. It is a core driver of the informational flows that underpin contemporary social and economic systems. This process is closely linked to the logic of *informationalism*, as conceptualized by Castells (2010), who argued that society has entered a stage of development where information is the primary source of productivity, power, and social organization. Our "informationalised" society is profoundly dependent on the generation, processing, and transmission of information (Webster, 2014, p. 133), thus positioning digital information at the centre of our existence in late modernity.

In the context of informationalism, the digital food environment is co-produced through continuous flows of data and the meanings attributed to these data. Digital food commodities and services, as well as social practices such as the sharing of digital food photos with family and friends, seeking health and nutrition information via internet search engines, and consuming digital food content in social media, are, in essence, informational flows. The digital food environment is therefore not only underpinned by food (as a material object), but by the generation, circulation, and consumption of digital information.

Globalized flows of information intensify people's need for a sense of identity, belonging, and personal value within an increasingly interconnected and often homogenized world (Castells, 2010). This increased need for turning attention to the self has been theorized as the process of individualization. *Individualization* refers to a late modern process through which traditional structures and collective certainties lose their guiding influence,

leaving individuals increasingly responsible for constructing their own life narratives, identities, and making reflexive choices (Beck & Beck-Gernsheim, 2002; Giddens, 1991).

Our analysis indicated that individualization influences both agency and structure in the digital food environment. On the one hand, individualization affects how people enact material and social food practices. Individuals increasingly develop their dietary habits through reflexive engagement with digital media, for instance by searching for food inspiration on social media or engaging in ongoing online food trends (Doub et al., 2016; Lavis, 2017; McInnes et al., 2023; Topham & Smith, 2023). There is also high interest in digital products and services that provide opportunities for self-monitoring and dietary customization, often based on ideals of health optimization, self-improvement, and convenience (Granheim et al., 2025; Lupton, 2018; Lupton & Jutel, 2015; Singh et al., 2019), the latter having been identified as a major driver of current food environments (Bogard et al., 2024).

On the other hand, individualization also contributes to the structuring of the digital food environment itself. Digital products and services are conceived with personalization as a core principle, designed to adapt to the unique needs, preferences, and lifestyles of users. The development of digital food commodities and services increasingly prioritizes features such as convenience, flexibility, and adaptability, attributes that enhance their appeal and therefore purchase and use. This dynamic is further intensified by AI, which enables mass personalization at an unprecedented scale, making digital content appear more relevant, engaging, and satisfying (Hermann, 2022). While this personalization may increase consumer satisfaction, it simultaneously serves commercial interests and risks reinforcing existing social inequalities, for instance by disproportionately affecting individuals with limited critical digital literacy skills, and through the collection and commodification of personal data without fully informed consent.

This is not to suggest that digital technology has failed to provide opportunities for collective action. On the contrary, it has enabled new modes of operation for alternative food networks and food sharing platforms, which strive for more sustainable and equitable food access (Granheim et al., 2021; Lewis, 2018; Michelini et al., 2018; Rivera et al., 2023). However, these collective efforts remain marginal in relation to the dominant, commercially driven dynamics of current digital food environments.

Individualization, with its emphasis on reflexivity, personal choice, and self-management, has been interpreted as a manifestation of neoliberalism (Dawson, 2012; Lazzarato, 2009). In our study, we identified *commercialization* as a key process shaping and driving the digital food environment. It refers to the growth- and accumulation-oriented neoliberal ideology that promotes the expansion of individual entrepreneurial freedom and free markets. According to Harvey (1990, 2005), such neoliberal ideology assumes that unregulated market mechanisms will naturally generate growth and self-correct towards beneficial societal outcomes.

Commercialization shapes food practices by positioning choice as a personal responsibility, which underpins the current development of digital technologies. The proliferation of highly personalized digital food commodities and services reflects the underlying market logic of continuous innovation and profit maximization. For example, we observed that nutrition-related smartphone apps have become widespread, as software developers compete to sell tools for dietary management, meal planning, and health monitoring, designed to maximize user appeal through convenience and adaptability. Similarly, food retailers and

delivery platforms increasingly deploy personalized discounts and product recommendations to enhance consumer engagement and increase sales.

Further, the strategic incorporation of social media influencers and other digital content creators as marketing agents contributes to creating a consumerist social media environment, where consumption is normalized and incentivized (Khamis et al., 2017; Sikka, 2019). These practices often exploit consumer vulnerabilities, negative self-perception, and dissatisfaction with their own bodies, diets, and lives, impacting people's emotional well-being as they need to navigate the market logics of neoliberalism when enacting food practices (De Souza, 2025). Neoliberal ideology shapes the role and value of bodies in the market, assigning blame for bodies that deviate from societal norms (Ivancic, 2018).

This effect is amplified by the ubiquity of digital body and food imagery, which characterizes the *exposure amplification* process we identified as a driver of the digital food environment. We observed that food imagery and messaging are embedded across various digital platforms and services, leading to an amplified exposure to *food*, which, beyond a material product, has become digital content, circulated through advertisements, social media posts, recipe tutorials, cooking videos, and entertainment media. Further, we observed that exposure to *body* imagery is also amplified. Digital content creators provide visibility to diverse body types, personal body transformation stories, and fitness tutorials, which can promote inclusivity and reinforce the narrative that all bodies have worth (Cwynar-Horta, 2016; Sastre, 2014). However, this positive narrative frequently coexists with—and is likely overshadowed by—digital content reinforcing unrealistic and unhealthy body ideals, impacting health negatively (Fioravanti et al., 2022; Holland & Tiggemann, 2016).

We argue that, in the digital food environment, this duality of exposure celebrating diversity while perpetuating neoliberal-driven normative ideals is shaped by commercial agents, fostering confusion, cognitive overload, and the internalization of unattainable expectations regarding own diets, bodies, and health. Regardless of whether the messaging is framed positively or negatively, the persistent exposure to food and bodies in digital settings carries implications for nutrition and health. The volume and pervasiveness of digital food content can subtly but cumulatively influence food choices and consumption patterns in ways that are difficult to identify and measure. We argue that the ubiquity of such content within daily digital food practices increases the likelihood of its impact over time. As indicated by van Kessel et al. (2025), by being heavily exposed to digital transformations, even younger and healthier populations are at risk of its adverse effects.

The dynamics of digital exposure risk exacerbating existing social inequalities. Opportunities to opt out of this exposure are limited and often challenging to navigate, raising concerns about real opportunities to exercise agency and autonomy in technology choices (Kuntsman et al., 2019; Taylor, 2017). When individuals are compelled to exchange personal data for economic incentives, such as discounts offered through supermarket apps, those most in need of financial relief may lack a genuine ability to opt out of paying less. When the social norm is to consume digital food content regularly, groups with lower levels of digital literacy may be unequipped to critically assess the credibility, intentions, and potential impacts of the content they engage with, leaving them more vulnerable to persuasive marketing, misinformation, and unhealthy dietary influences.

3.2.4. Outcomes

The model in Figure 3 indicates that the dynamics of the digital food environment, driven by digitalization, informationalism, individualization, commercialization, and exposure amplification, may have impacts on nutrition, health, equity, human rights, and the environment. Our study did not map or measure specific outcomes. Previous studies have indicated that digitalization of the food environment may be impacting food choices, purchases, and intake, as well as body dissatisfaction, and thereby health and nutrition outcomes (Granheim et al., 2021; Lafontaine et al., 2025; Powell & Pring, 2024). However, this is an emerging area and further investigation is needed.

Recent studies have also explored ways in which the digital food environment may promote equitable access to healthy and sustainable diets (Greenthal et al., 2024; He & Chen, 2024; Powell & Pring, 2024), indicating the potential to leverage digital technologies in that direction. Nevertheless, access to digital tools, digital literacy, and meaningful engagement with health-related resources remain unevenly distributed (Badr et al., 2024). Digital technologies can both reflect and reproduce structural inequalities, hence the impacts of the digitalization of the food environment are likely to be uneven globally and in relation to sociodemographic groups.

3.3. Comparing Traditional Food Environments and Digital Food Environments

The elements that compose traditional food environment models are accommodated within our conceptualization of the digital food environment. They fall, for the most part, under material food practices, which include food properties such as nutritional value, quality, price, sustainability, safety, convenience, among others. In our proposed models, however, social practices and the interplay between all domains become more evident.

Not all aspects of the digital food environment represent entirely new practices. Many food practices we observed have historically existed in the context of the food environment and endure, coexisting alongside and entangled with digital practices. While people now watch cooking shows and other people eating through live-streaming on digital platforms (Lee & Wan, 2023), audiences have enjoyed cooking programs since the advent of television (Collins, 2015), and likely observed each other in cooking and eating situations in domestic or community settings before television existed. Similarly, social media platforms facilitate engagement and community building around shared interests, including food, but these activities traditionally occurred in physical spaces where individuals gathered. While self-tracking apps now help individuals monitor their diets on smartphones (Lupton, 2019), some people earlier kept physical food journals. While it is now common practice to search for recipes and health information online (X. Jia et al., 2021), people earlier consulted cookbooks, diet guides, and magazines for similar insights.

The distinction lies in the speed, reach, and volume of digitally augmented practices. A defining feature of digital technology is its capacity to exponentially expand the reach and speed of information dissemination. Unlike traditional media, where content distribution was more predictable, subject to editorial control and temporal limitations, digital food content is spread globally within seconds. Algorithms further amplify this reach by prioritizing content based on engagement metrics (e.g., likes, shares, comments), rather than considerations of accuracy, reliability, or public health value. Information and inspiration are now available

instantly and continuously, with digital food content being ubiquitous in unprecedented ways. The convenience and ease of use of digital food tools and services facilitate engagement, exposing individuals to ideas, trends, and products they might never have encountered otherwise.

This amplified pace, constancy, and breadth of digital exposure create a food environment that is more persuasive and immersive than ever before. We argue that the relentless flow of digital food information, for example in the form of new apps, new food trends on social media, and the frequent appearance of food in digital media outlets, creates barriers to establishing stable and health-promoting societal narratives about food and nutrition. The sheer volume of digital food information available makes navigating the digital food environment more cognitively demanding than traditional food environments, requiring advanced critical and digital health literacy levels, hence potentially widening the digital divide.

4. Limitations of This Study

The theoretical framework we have proposed offers a broad and flexible approach to understanding the digital food environment. It is intended as an ontological model that identifies key dynamics shaping social and material food practices in late modernity, rather than describing definitive categories. In a study of this nature, it was not possible to measure direct impacts on health or nutrition outcomes. Future research can build on this foundation to conduct in-depth empirical investigations into specific components of the model, as well as explore the extent and direction of outcomes.

We recognize the Western-centric orientation of this model. Our elicited data were collected in Norway, and the extant data draw primarily on studies conducted in high-income, Western contexts, reflecting the current availability of research in this area. Integrating perspectives from low- and middle-income countries requires further research to explore how processes associated with late modernity, such as urbanization and uneven digital access, can be taken into account, in addition to the multiple burden of malnutrition in all its forms affecting these countries. Adapting the model to reflect these diverse realities would improve its explanatory power and applicability. Future studies could apply similar grounded theory approaches to explore the locally situated dynamics of digital food environments across the globe.

Moreover, our analysis did not evaluate interventions or emerging approaches in the digital food environment that leverage digital technology for improved health, nutrition, and equity. This remains an important gap, as understanding the effectiveness, accessibility, and, crucially, the ethical implications of such innovations is essential for informing evidence-based policy and practice in late modernity.

5. Policy Implications

While theoretical in nature, our model has practical implications for advocacy, policy, and regulatory efforts. It challenges the adequacy of purely technocentric solutions (such as the proliferation of individual health apps) that often overlook the complexity of social food practices and the interplay between agency and broader social structures that we have illustrated in the framework. Current public health challenges, including noncommunicable diseases, equity, and planetary health, require more than utilitarian, individualized, technology-driven interventions. They demand attention to the complex and often unintended consequences of technology on social practices.

Further, the convergence of powerful commercial and quasi-commercial entities in the technology and food sectors will likely amplify existing power asymmetries in food environment governance, framing social structures in ways that benefit these entities and align with their goals. The involvement of public health professionals in discussions on digital technology regulation and AI moving forward may support the development of policies and regulations that are in line with public health goals.

National guidelines addressing food and nutrition challenges would benefit from acknowledging the embeddedness of digital technologies in the everyday food practices of both individuals and organizations. Our theory of the digital food environment indicates that agents such as social media influencers and AI are not peripheral influences. They have become integral to food practices in late modernity. Further, research and action on the digital food environment should consider that non-human agents are neither neutral nor static entities. They too are a social product that can be designed and governed in ways that either reinforce or challenge existing power relations and social inequalities. In the context of rapid technological change and the increasing role of non-human agents, the protection of human rights (such as the right to health and the right to adequate food) needs to be strengthened. The digital food environment, as a socially co-produced space, could be regulated in ways that serve the public interest, prioritizing public health goals over commercial or technological imperatives.

Existing policies and regulations need strengthening, for instance, with regard to the regulation of digital food marketing, personal data protection, and requirements for transparency and accountability in algorithmic systems that influence food practices (e.g., how food is digitally recommended or promoted). Additionally, the equitable promotion of digital food literacy and critical thinking skills (including regarding AI use) from an early age is essential so that individuals are better equipped to engage critically with their digital food environments and challenge structural constraints.

Finally, growing attention should be paid to rising forms of human–technology interaction. Wearables that monitor physical activity, diet, and body metrics are already commonplace, and emerging forms of human enhancement (such as neural or subcutaneous implants) are progressing the integration between human and non-human agents, thus warranting further investigation.

6. Conclusion

This study set out to conceptualize the digital food environment within the context of late modernity, recognizing digitalization as a transformative force reshaping food environments. Our proposed ontology for the digital food environment recognises its nature as a socially co-produced augmented space, and its function as a social structure shaping and shaped by (social and material) food practices, where digital technology mediates, enhances, enables, or replaces such food practices. The framework illustrates the dynamic interplay between (human and non-human) agency and social structures, driven by late modern processes such as digitalization, informationalism, individualization, commercialization, and exposure amplification. These dynamics generate both opportunities and challenges for nutrition, health, equity, human rights, and environmental sustainability.

Existing power asymmetries among human agents, such as those between public and commercial entities, are exacerbated in the digital food environment by the inclusion of technology companies in food

environment governance. The ontological foundation of our framework provides theoretical contributions to challenging the neoliberal assumption that food choices are a product of individual responsibility, which has been intensified in the context of late modernity.

By making visible the complex interdependencies between structure and agency, our study advances the theoretical foundation for future research and policy, highlighting the need for policy approaches that address the digital dimensions of food environments, ensuring that technological advancements serve public health and equity objectives to avoid widening existing social inequalities. Policies and regulations to promote healthy food environments must consider their increasingly digitalized nature.

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Conflict of Interests

The authors declare no conflict of interests.

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Governing the Infrastructural, Spatial, and Social Consequences of Urban Digital Food Delivery Platforms

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Abstract

Digital food delivery platforms (DFDPs) are transforming how food is distributed and consumed in cities, but also how urban space, infrastructure, and labor are organized. This article examines how DFDPs affect urban infrastructure in cities by analyzing their spatial, logistical, and governance impacts. Drawing on interviews with municipal officials, platform companies, and civil society actors in three Swedish cities, as well as document analysis and literature review, the study explores how DFDPs challenge conventional planning and regulatory frameworks. Using the lenses of spatial inequality, platform urbanism, and anticipatory governance, the article investigates how platforms operate through hybrid infrastructures that can affect land use, public space, and spatial equalities. While municipal responses remain fragmented and reactive, emerging experiments offer glimpses of more inclusive and future-oriented governance. The article suggests that urban planning approaches need to recognize DFDPs as infrastructural actors and integrate them into coherent regulatory strategies.

Keywords

anticipatory governance; digital food delivery platforms; gig economy; last-mile delivery; platform urbanism; spatial inequality; Sweden; urban infrastructure

1. Introduction

Digital food delivery platforms (DFDPs), including food delivery apps, online grocery services, and consumer-to-consumer food-sharing platforms, are transforming how food is distributed, accessed, and

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consumed in urban environments (Bissell, 2020; Fernandez & Raine, 2021). These platforms represent a paradigmatic shift in food provisioning, characterized by real-time ordering of food, mobile logistics (i.e., logistics are carried out by individual, mobile workers rather than by fixed fleets, and coordinated digitally in real-time across the city), and the outsourcing of labor to individualized gig-workers (Bissell, 2020; George & Tomer, 2022a; Heidenstrøm & Hebrok, 2022; van der Laan & Orcholska, 2022). In doing so, they increasingly influence not only consumer behavior but also the organization of urban space, urban infrastructure, and labor relations (Bissell, 2020; Heidenstrøm & Hebrok, 2022; Samsioe & Fuentes, 2022; Schneider & Eli, 2023). The rise of DFDPs signals a reconfiguration of urban food systems into a distributed, on-demand service model that intersects with city logistics, micro mobility, environmental zoning laws, and the governance of public space (Li et al., 2020; Oncini et al., 2020).

This transformation has occurred rapidly and often beyond the scope of traditional urban governance (Suali et al., 2024; Vărzaru, 2024). While DFDPs have provided consumers with unprecedented convenience, speed, and variety, they also introduce new challenges: intensifying congestion and emissions through last-mile deliveries (Bissell, 2020; Donaldson, 2022; George & Tomer, 2022a); creating ambiguous labor arrangements via gig work (Friedman, 2014; Vandaele, 2022); and generating infrastructural demands that are not formally accounted for in city planning (Donaldson, 2022; Ghirlanda, 2024; Janatabadi et al., 2024). Moreover, municipalities are struggling with developing effective strategies to regulate and intervene in these platforms in order to avoid negative impacts on urban life and development. Despite the expanding role of DFDPs in cities, their infrastructural and spatial consequences remain underexplored in both policy and planning (Heidenstrøm & Hebrok, 2022). Globally, platform economies are increasingly shaping the rhythm and texture of urban life (Hardaker, 2021; Huws, 2020).

From transport to food delivery, platforms have become central intermediaries in how services are accessed and delivered, often by repurposing and extracting value from existing urban infrastructures (Shapiro, 2021; Srnicek, 2017). Their logic of operation—real-time data use, algorithmic coordination, and asset-light expansion—has enabled platforms to scale quickly while offloading infrastructural, environmental, and labor costs onto workers and municipalities. In cities worldwide, this shift has prompted urgent debates around the governance of shared space, mobility infrastructures, labor rights, and the ecological footprint of on-demand services (Hardaker, 2021; Riordan et al., 2023).

Among platform services, food delivery stands out for its ubiquitous, visible, and daily presence in urban space (Dal Gobbo et al., 2022). DFDPs operate not only in private kitchens and digital interfaces but also require the city's streets, sidewalks, parks, and transport systems to function. They blur distinctions between public and private, formal and informal, consumption and production. Yet, the integration of DFDPs into everyday life often occurs without accompanying adaptations in policy, planning, or public infrastructure (Heidenstrøm & Hebrok, 2022; Li et al., 2020; Meemken et al., 2022). As platforms grow, municipalities struggle to keep pace with the new spatial logics and infrastructural demands they generate.

These developments are particularly relevant to ongoing concerns with spatial justice and urban inequality (B.-Y. Lee, 2024; D. J. Lee, 2018). Cities have long been sites of uneven access to services, infrastructure, and public goods, shaped by historical patterns of segregation, zoning, and political power (Agyeman, 2022; Soja, 2013). Platformization introduces new forms of inequalities: While certain populations enjoy easy access to on-demand services, others disproportionately absorb their externalities—such as traffic, noise, or informal

labor conditions (B.-Y. Lee, 2024; Przybylinski, 2023). This raises critical questions about whose needs are prioritized in the organization of digital food systems, and how cities can ensure equitable access to infrastructure, space, and regulatory protection in the platform era.

As cities increasingly promote strategies for compactness, walkability, and multimodal mobility, aiming at reducing carbon footprint—such as the 15-minute city concept or climate-neutral logistics—DFDPs emerge as both an opportunity and a disruption (Elldér, 2024; Heidenstrøm & Hebrok, 2022). These platforms operate at the intersection of multiple systems—food delivery, transport, logistics, digital labor, and public space governance—yet rarely fall neatly into any single domain of municipal oversight (Hardaker, 2021). In Sweden, these issues arise in a planning context that is both ambitious and limited. Cities like Stockholm, Gothenburg, and Malmö pursue sustainability, inclusivity, and data-driven innovation. DFDPs can support car-free urban living, including for those with limited mobility. Yet cities struggle to regulate fast-changing services that cross administrative and regulatory boundaries. DFDP governance reveals tensions between digitalization and spatial justice, market-led innovation and public planning. Questions about who uses public space, on what terms, and for whose benefit, are becoming increasingly urgent as mobile, decentralized labor expands.

To analyze these dynamics, a qualitative case study has been conducted in the Swedish cities of Stockholm, Gothenburg, and Malmö. In doing so, our study addresses the growing body of international research on how DFDPs reshape urban life—touching on themes such as spatial inequality (Soja, 2013), platform urbanism (Bissell, 2023; Caprotti et al., 2022), and the capacity of cities to anticipate technological transformations (Muiderman et al., 2023) and govern their impacts. While this article focuses on the disruptive infrastructural and governance impacts of commercial food delivery platforms, some platforms—particularly peer-to-peer food-sharing models and emergency delivery partnerships—have also shown potential to reduce food waste and improve food access for vulnerable groups, especially during crises like the Covid-19 pandemic (Michelini et al., 2018; Nica-Avram et al., 2021; Zanetta et al., 2021).

1.1. Research Aims and Questions

This article investigates how DFDPs are reshaping urban infrastructures and the fabric of urban life. Of particular interest are the attempts of municipal governance to get a better grip on the social and spatial consequences of DFDPs in Sweden. The article seeks to answer two central questions:

1. How do DFDPs shape the spatial organization and use of urban infrastructure in Swedish cities?
2. How are municipalities and national actors responding to the infrastructural and governance challenges posed by DFDPs?

This study uses interviews with municipal actors, platform companies, and civil society in Stockholm, Gothenburg, and Malmö, along with policy documents and academic literature. It highlights the infrastructural, spatial, and governance challenges of DFDPs to support more anticipatory urban planning that tackles digitalization, labor precarity, and spatial justice.

2. Literature and Policy Context

DFDPs sit at the intersection of multiple research fields—urban planning, food systems, labor studies, and platform governance. As a result, their urban impacts must be understood through a multidisciplinary lens. Recent scholarship emphasizes that DFDPs do more than providing food access; they reorganize the infrastructures of urban provisioning (Bissell, 2020; Fernandez & Raine, 2021; George & Tomer, 2022b; Granheim et al., 2022). From a planning perspective, DFDPs shift consumption from fixed locations (e.g., grocery stores, restaurants) to distributed networks reliant on logistics hubs, courier fleets, and consumer data. These shifts have significant spatial and regulatory consequences.

A growing body of research documents the dual nature of DFDPs. On the one hand, they offer expanded access to food for consumers with digital and economic means (Granheim et al., 2022). On the other hand, they bypass regulatory frameworks, amplify labor precarity, and alter the use of public infrastructure (Meemken et al., 2022; Schneider & Eli, 2023; Stehrenberger & Schneider, 2023). The gig labor model, in particular, challenges welfare-state institutions and work environment regulations by introducing algorithmic control over workers who are legally classified as self-employed or employed on short contracts by workforce management firms. As a result, app companies are not held responsible for labor protections (Westregård, 2025).

Scholars have introduced the concept of platform urbanism (Barns, 2019; Bissell, 2023; Caprotti et al., 2022; Karvonen et al., 2020; A. Lee et al., 2020) to describe how digital platforms reorganize the city, often invisibly. Platforms such as Uber Eats, Wolt, and Foodora do not own the kitchens or vehicles that fulfill their services but act as coordinating intermediaries that extract value through data and scale. This creates challenges for urban governance, which is accustomed to regulating fixed entities—retailers, buildings, transport networks—rather than fluid assemblages.

Spatial inequalities are further reinforced by DFDPs through infrastructural placement and service targeting. Studies show that ghost kitchens are often located in low-rent districts while their services are marketed to affluent neighborhoods (Shapiro, 2021). Delivery workers, too, are spatially segregated from consumers, operating largely in outdoor, precarious conditions, often without access to restrooms, shelter, or secure parking. These dynamics echo long-standing critiques of food deserts and food apartheid, recontextualized in the digital age (Davies & Reid, 2024; George & Tomer, 2022b; Janatabadi et al., 2024).

In recent years, urban food policies have emerged as key instruments through which cities address sustainability, equity, and resilience in food systems (International Panel of Experts on Sustainable Food Systems, 2017; Moragues-Faus & Battersby, 2021). Initiatives such as the Milan Urban Food Policy Pact have catalyzed local governments to take more active roles in governing food provisioning, often focusing on local sourcing, food justice, and public procurement. However, most urban food policies still prioritize traditional supply chains and tend to overlook the impacts of platform-mediated distribution models (Barbour et al., 2023). This gap is significant, as DFDPs increasingly mediate access to food in urban areas while remaining outside the scope of existing food governance frameworks.

Policy responses to DFDPs remain limited and fragmented. In Sweden, strategies like the Swedish Food Strategy focus on sustainability and health but do not yet fully address platform-based delivery (Löfven &

Bucht, 2016; Regeringskansliet, 2025). On a local level, Stockholm, Gothenburg, and Malmö all have internal food policies regulating sustainability and health aspects in public food procurement and food environments. Still, neither city has a geographic food policy, embracing the role of food systems in the city, and has not signed the Milan Urban Food Policy Pact (2015).

The National Strategy for Sustainable Urban Development references digitalization and freight management but lacks concrete tools for municipalities dealing with gig-based delivery models. At the municipal level, Stockholm's Bicycle Plan and Vision 2040 emphasize walkability, reinforced bicycle infrastructure, and climate neutrality, but interview data suggest these frameworks do not yet incorporate DFDP-related logistics in planning for biking and walking infrastructure (Trafikkontoret Stockholms Stad, 2022). Strategies focusing on sustainable freight transport, like Gothenburg's Sustainable Urban Logistics Plan 2024–2030, mention common delivery lockers as an important distributed infrastructure and partnerships with logistics companies to develop sustainable solutions. Malmö's draft Traffic and Mobility Plan considers micro mobility and shared logistics in greater detail. Still, most of these policies remain in pilot stages. The 2024 EU Platform Work Directive (European Parliament & Council of the European Union, 2024) represents a significant policy shift, even though the final version does not include general EU-wide criteria for assessing whether platform workers should be classified as employees, but obliges member states to define these employment indicators for platform workers and ensure transparency in algorithmic management. In Sweden, the directive is expected to be implemented by 2025 following a government inquiry, which presents an opportunity to realign labor protections and public governance with the realities of platform work—though how these directives will address spatial and infrastructural concerns remains uncertain.

The literature and policy review reveal an underexplored area: how DFDPs impact urban infrastructure and spatial governance. While labor and health effects are increasingly studied, their material footprint and the capacity of urban institutions to respond remain less understood. This study uses spatial inequality, platform urbanism, and anticipatory governance as a framework to examine how DFDPs reshape infrastructure and governance, focusing on distributional impacts, infrastructural change, and institutional response. These concepts are detailed in Section 4.

3. Methodology

3.1. Data Collection

This study uses a qualitative, mixed-method approach combining semi-structured interviews with a review of national and local policy documents and academic literature. A qualitative approach was chosen to capture the situated experiences, institutional perspectives, and spatial practices related to DFDPs.

This study draws on 37 interviews, observational fieldwork, policy documents, and a literature review. Conducted between October 2024 and April 2025, interviews involved municipal officials (from planning, traffic, public health, and food policy departments), platform companies (including ghost kitchens), gig workers, and civil society actors in Stockholm, Malmö, and Gothenburg (Table 1). Participants were selected through purposive and snowball sampling. Interviews followed semi-structured guides tailored to each group and aligned with the study's focus on spatial inequality, platform urbanism, and anticipatory governance (see the Supplementary File). Most were recorded and transcribed; where not, detailed notes

were taken. Fieldwork in public courier hotspots (e.g., transit hubs, parks) documented logistical practices and infrastructure use, with informal conversations offering further insights.

The data collection process also included a targeted review of policy and strategy documents from the past five years, both at the national and municipal levels. Key documents analyzed include the Sweden's National Food Strategy, the National Strategy for Sustainable Urban Development, Gothenburg's Sustainable Urban Logistics Plan 2024–2030, Stockholm's Bicycle Plan, Vision 2040, Accessibility Strategy, and Freight Transport Plan, Malmö's draft Traffic and Mobility Plan, and the Platform Work Directive of the European Parliament and of the Council (2024). These documents provided a governance and policy context within which to interpret empirical findings, especially in relation to regulatory gaps, institutional capacity, and infrastructural adaptation. Additionally, relevant academic literature on platform urbanism, spatial inequality, hybrid infrastructures, and anticipatory governance was reviewed to develop a robust conceptual framework.

Table 1. Summary of data collection activities.

Stakeholder Group	Number of Participants	Method	Notes Taken
Municipal officials	10	Semi-structured interviews (in person/online)	Yes (audio recorded and transcribed; 2 note-based)
Platform representatives	4	Semi-structured interviews (in person/online)	Yes (audio recorded and transcribed; 1 note-based)
Gig workers (informal interviews)	20	Informal conversations during observational fieldwork	Yes (all note-based)
Civil society actors (e.g., advocacy groups for gig workers and one organization focused on labor rights)	3	Semi-structured interviews (in person/online)	Yes (audio recorded and transcribed; 2 note-based)

3.2. Data Analysis

The empirical material—including interview transcripts, policy documents, and field notes—was analyzed using the NVivo 15 qualitative data analysis software. A descriptive coding method was employed to structure and interpret the data (Saldaña, 2021). In the initial phase, descriptive codes were assigned to excerpts to summarize the main topics or activities discussed. These codes were subsequently refined into conceptual categories, allowing for the identification of recurring patterns and significant themes that emerged across different data sources.

The development of interpretive themes was guided by both existing literature and inductive insights from the data. These themes were used to contextualize the empirical findings within the study's research objectives and theoretical framework. Key thematic areas included:

- Platform impacts on public space and infrastructure: e.g., informal courier hubs, curb use, spatial conflicts;
- Labor conditions and governance gaps: e.g., precarious work, outsourced employment, lack of rest facilities;

- Municipal policy responses: e.g., pilot programs, regulatory fragmentation, departmental silos;
- Spatial inequality and exclusion: e.g., clustering of infrastructure in high-traffic areas, uneven distribution of burden.

The findings from these themes were triangulated across interviews, policy analysis, and relevant literature to surface both *commonalities and divergences*. A *critical urban governance lens* was applied throughout, focusing on how DFDPs challenge traditional regulatory frameworks and urban planning approaches. This analysis supports a grounded understanding of the governance gaps and infrastructural consequences associated with the platformization of urban food systems. To ensure validity, data were gathered through a mix of methods, including interviews, field observations, and policy documents. Coding consistency and theme development were cross-checked among researchers to enhance reliability.

4. Spatial Logics and Infrastructural Assemblages

To analyze how DFDPs affect urban infrastructure and governance in Swedish cities, this study draws on three interrelated theoretical frameworks: *spatial inequality*, *platform urbanism*, and *anticipatory governance*. These frameworks together allow for a critical and multidimensional interpretation of the infrastructural, spatial, and regulatory challenges posed by DFDPs. They are also helpful in examining the uneven geographies of food access, infrastructure burdens, and the governance gaps that DFDPs make visible.

First, the concept of *spatial inequality* provides an essential foundation for understanding how DFDPs interact with and reshape urban geographies. Drawing on Soja's (2013) formulation of spatial justice and Agyeman's (2022) idea of just sustainability, this lens focuses on how infrastructural benefits and burdens are distributed across space. In the context of DFDPs, spatial inequality manifests in multiple ways. Logistical infrastructures such as dark kitchens (facilities that prepare food exclusively for delivery), dark stores (warehouses set up for online grocery fulfillment), and delivery hubs (designated areas for organizing last-mile distribution) are often located in lower-income or industrial districts, while the consumption they enable is disproportionately concentrated in wealthier central neighborhoods. This spatial decoupling of production and consumption reinforces patterns of urban inequality, while the public space impacts—such as noise, crowding, and emissions—are often externalized to areas that lack political leverage or planning influence. This lens also highlights how labor geographies mirror infrastructural inequality, as precarious platform workers, often migrants or young people, are more likely to operate in marginalized conditions with minimal spatial rights in the urban landscape.

Second, *platform urbanism* conceptualizes DFDPs not simply as digital innovations, but as actors that produce and shape urban infrastructure. Following Bissell (2020, 2023) and Caprotti et al. (2022), platform urbanism frames DFDPs as infrastructural systems that blend algorithmic management with physical space—often without clear regulatory classification. Platforms do not merely coordinate logistics; they create new spaces of production (ghost kitchens), mobility (courier flows), and occupation (informal courier hubs). These spaces often exist in regulatory gray zones, where zoning laws, labor protections, and infrastructure planning have not caught up. The logic of platformization—rapid scaling, externalization of risk, and algorithmic control—disrupts the spatial governance tools available to municipalities. DFDPs thus challenge the municipalities' ability to manage urban transformation, not because of malice or evasion, but because the spatial logics they follow are fundamentally different from those of the welfare-regulated city, with institutions and regulations largely formed in the industrial era.

Central to understanding these processes is the notion of hybrid infrastructures—assemblages of digital coordination systems, physical resources, and urban labor that co-produce a new logistical layer in the city (Andersson et al., 2022; Fodor, 2021). Hybrid infrastructures are neither entirely public nor private, formal nor informal, fixed nor mobile. They emerge through the interaction of gig workers, app-based orders, physical mobility tools, and the use of underregulated public space for work-related purposes. Drawing on Andersson et al. (2022) and Fodor (2021), this concept reveals how infrastructure today is co-constructed at the intersection of algorithmic platforms and everyday urban navigation. From improvised courier hubs under bridges, to rest stops in shopping centers, to bikes and mopeds parked informally in green zones or along curbsides, hybrid infrastructures expose the spatial dependencies of the platform economy. They are infrastructural in function but invisible in planning—highlighting both the limitations of existing urban governance and the lived innovation of precarious workers. By attending to these assemblages, this article focuses not only on how infrastructure is evolving, but also how labor and mobility sustain it, and how cities must adapt to its informal logics.

Third, the concept of *anticipatory governance* (Muiderman et al., 2023) addresses how institutions respond to such emerging socio-technical systems. Anticipatory governance refers to the capacity of public institutions to engage with uncertain futures, especially in the context of rapid technological change. Applied to DFDPs, it helps explain the fragmented and reactive nature of municipal responses. Many cities are trying to regulate the increase in digital purchase and platform-facilitated home delivery, experimenting with shared delivery lockers, supporting electrified micro-logistics, and taking the initiative to dialogue with platform companies. Yet these initiatives remain largely uncoordinated, and many operate without a long-term strategic vision. Anticipatory governance demands more than technical adaptation—it requires institutional reflexivity, cross-sectoral coordination, and political will to address systemic transformations before their full consequences are felt.

This theoretical approach stresses the importance of inclusive governance involving platform workers, small food retailers, planners, and transport authorities. By applying anticipatory governance, the article highlights the mismatch between fast-moving platforms and slower municipal processes. Cities need tools to not just react, but actively shape platform futures aligned with equity, sustainability, and livability goals.

Together, these three frameworks offer a critical toolkit to unpack the infrastructural, labor, and spatial dimensions of DFDPs. Spatial inequality makes visible who gains and who loses from infrastructural change; platform urbanism uncovers the mechanisms by which digital systems reshape cities; and anticipatory governance reveals the challenges and opportunities of crafting proactive urban policy. Applying this theoretical triad throughout the analysis enables a more comprehensive and justice-oriented understanding of how DFDPs are not just disrupting cities—but becoming part of their infrastructural fabric.

5. Results

This section presents findings structured around the infrastructural, spatial, and governance effects of DFDPs in Stockholm. It incorporates direct quotations from interviewees and is organized in relation to the theoretical lenses of spatial inequality, platform urbanism, and anticipatory governance.

5.1. Hybrid Infrastructures and Urban Assemblages

The rise of DFDPs has produced a new form of urban infrastructure—one that is distributed, mobile, and hybrid. Such an infrastructure is not centrally planned nor publicly managed but are emergent, made through the everyday choices of gig workers and the operational logics of platforms. Rather than fixed facilities, DFDPs rely on assemblages of vehicles, mobility tools, mobile devices, informal rest zones, and opportunistic parking arrangements.

The vehicles used in food delivery—e-scooters, mopeds, bicycles, and hybrid models—are often chosen based on availability and affordability, not regulatory compliance, or infrastructural compatibility. These choices are shaped by the constraints faced by gig workers, who typically bear the full responsibility for maintenance, fuel, charging, and repair. There is little standardization across platforms, and cities lack mechanisms for monitoring or supporting these emergent mobility systems. As a result, vehicle performance, safety, and environmental impact vary widely.

Parking these delivery vehicles has become a highly visible flashpoint in the urban fabric. Gig workers must identify their own places to park their vehicles, wait between orders, and rest between shifts—activities that would be regulated in traditional logistics sectors. In Stockholm, this improvisational use of space has led to the informal conversion of green areas, pedestrian zones, and underutilized spaces under bridges into semi-permanent waiting or parking areas. These are not recognized in any zoning category and often fall into regulatory grey zones.

These informal infrastructures not only reflect a lack of planning but also represent an adaptive strategy by workers navigating a city not designed for them. Under bridges and near major transit hubs—such as Odenplan, Medborgarplatsen, or Fridhemsplan—couriers cluster to find shelter, access restaurants, or simply rest. These spaces are simultaneously public and private, mobile and fixed, visible and overlooked.

This hybrid infrastructure is a key manifestation of platform urbanism. It blurs the boundaries between work and public life, between planned infrastructure and lived experience. Unlike traditional logistics infrastructure—warehouses, freight corridors, and docks—these gig infrastructures are decentralized and transient. They rely on what is available, not what is planned. Yet they form the backbone of the digital food economy.

Moreover, this form of infrastructure reproduces precarity: It is informal, temporary, and unsupported. Unlike restaurant terraces, which require permits and often fees to occupy public space, gig worker hubs emerge without institutional recognition or support. Municipalities, as noted by several interviewees, do not see it as their role to “create fika spots for couriers”—a sentiment that reflects broader questions about whose labor is valued and whose needs are included in urban planning (Interviewee M3).

In this context, hybrid infrastructures challenge cities to rethink what counts as infrastructure, who it is for, and how it is governed. The digitalization of food delivery has not eliminated the need for urban infrastructure—it has only made it more invisible, informal, and unequal. Recognizing and addressing these hybrid assemblages is essential to any equitable approach to planning for digital platforms.

5.2. Platformization of Urban Logistics Under Data Opacity and Regulatory Gaps

DFDPs operate through hybrid infrastructures that combine digital ordering systems with physical food preparation and delivery networks. Stockholm's delivery system increasingly depends on ghost kitchens, fulfillment centers, and decentralized courier networks. These infrastructures tend to be located in industrial areas and peripheral neighborhoods with lower rents. As one planner from Stockholm Municipality noted: "Many of these kitchens operate out of places where you wouldn't even expect a food business. It's hard to regulate when they're outside traditional restaurant zones" (Interviewee M6).

This spatial mismatch exemplifies how logistical efficiency can deepen spatial inequality by externalizing infrastructural burdens—such as emissions, noise, and traffic—to marginalized areas, while centralizing convenience in wealthier districts. A food inspector in Malmö Municipality explained: "We're seeing new forms of food provision that aren't visible to the consumer. But the impact—waste, transport, energy—is very real in the areas where these services operate" (Interviewee M8).

Companies like MatHem and Oda manage delivery through large fulfillment centers, leveraging algorithms to optimize routes. In contrast, Foodora and Wolt use gig couriers for individualized deliveries via mainly bikes, e-scooters, or mopeds. This fragmented landscape complicates municipal coordination efforts. A traffic planner in Gothenburg stated: "It's not like you're dealing with one logistics company. It's many small actors, moving fast, loosely connected. It's hard to even identify who to talk to" (Interviewee M5).

Planners across cities expressed concern that while DFDPs benefit from this spatial flexibility, municipalities are left with the infrastructural consequences. "They can just choose a warehouse and start operations," said a freight strategist in Gothenburg, "but we're the ones who have to manage the traffic they generate, the waste, the access points" (Interviewee M7).

Municipal officials consistently expressed frustration with the lack of access to operational data from DFDPs. Unlike e-scooter firms, which are subject to permit regimes and are required to share mobility data, DFDPs operate under no such obligations. A planner from Stockholm's innovation office explained: "We ask for delivery data, but there's no legal basis to demand it. Without that, we're planning in the dark" (Interviewee M1).

This lack of transparency hinders anticipatory planning. Another planner observed: "We can't prepare for impacts we can't measure. We see the symptoms—congestion, noise—but not the flows behind them" (Interviewee M3). This regulatory asymmetry reflects the broader governance challenge of treating DFDPs as urban infrastructural actors while lacking the policy tools to manage them as such.

Additionally, some municipal actors noted how this data invisibility undermines their ability to even begin dialogue. "If we don't know what platforms are operating in the city, or how many deliveries they make, how can we make rules that apply to them?" one planner asked (Interviewee M1).

5.3. Spatial Conflicts and Public Realm Use

The presence of couriers in public spaces, particularly near transport nodes like Odenplan and Medborgarplatsen, has emerged as a visible marker of DFDP activity. These locations function as informal hubs where couriers wait for orders, rest, or seek shelter. As one official from Stockholm's Department of Traffic noted, "We see groups of couriers at Odenplan. There's tension with other users of the space—residents, tourists, businesses. But they have nowhere else to go" (Interviewee M6).

Interviewees described how these informal uses create "freeloading" behavior: DFDPs benefit from city infrastructure without contributing to its upkeep. "You can't just convert a sidewalk into your logistics hub," said a planner at Stockholm's Municipality; "restaurants have to pay if they want a table on the street. But these platforms? They use benches and curb space for free" (Interviewee M6).

A parking investigator at Stockholm Municipality explained the contrast: "If you're a café and want to place two tables on the pedestrian path, you need a permit and you pay for that. But platforms? They just use public space like it's theirs" (Interviewee M2).

Couriers rely on benches, plazas, and malls as de facto break areas—spaces not designed as workplaces. A planner in Malmö City emphasized: "We don't build coffee spots for Ikea staff. So why should we design public space for gig couriers?" Yet, the reliance of gig workers on informal infrastructure underlines a form of infrastructural dependency that is neither acknowledged nor compensated for. A public space strategist in Stockholm added: "We see it happening, but it's not within anyone's formal responsibility. It falls between departments" (Interviewee M4).

Ethnographic fieldwork conducted in central Stockholm—particularly in Odenplan, Kungsholmen, and Södermalm—revealed the everyday spatial practices of gig couriers and the emergence of informal logistical infrastructures. Couriers frequently park mopeds under bridges, on sidewalks, and in front of storefronts (Figure 1). These areas, although not legally designated for delivery operations, have become de facto waiting zones, creating spatial friction with pedestrians, businesses, and local residents.

One of the most prominent hubs is Odenplan, which has evolved into a "nesting ground" for food delivery workers. The area's high density of restaurants makes it a hotspot for pickups, while its central location ensures consistent order flow. Couriers from platforms like Wolt, Foodora, and Uber Eats were regularly seen parking in rows—often along pedestrian walkways or clustered under bridges—turning public transit-adjacent areas into informal logistics zones (Figure 2).

Photographs captured during fieldwork show mopeds wrapped in protective plastic, tightly lined along building façades and beneath highway overpasses (Figure 1). These parking practices are not coordinated by any public authority or platform but result from the workers' need for convenience, proximity to restaurants, and shelter from the weather. While not overtly illegal, these uses blur the line between tolerated occupation and public nuisance. According to a planner at Stockholm Municipality (Interviewee M9), many residents expressed discomfort with these informal gatherings, particularly in areas with already limited pedestrian space.

Figure 1. Delivery mopeds parked under a bridge in Stockholm.

Figure 2. Delivery bicycles and mopeds parked along bicycle and pedestrian paths in Stockholm.

Fieldwork revealed a lack of dedicated infrastructure for gig workers in Stockholm—no official parking, rest areas, or shelters—despite their essential role in urban food logistics. Couriers often improvise, using benches, mall entryways, or outlets, which adds pressure to shared public spaces and fuels spatial conflict. A notable exception is the Foodora Rider Hub, mentioned positively by several couriers (e.g., Interviewee G12). The hub offers rest, basic amenities, and shelter, and was described as a "very nice place." However, its limited capacity and uniqueness only highlight the lack of adequate solutions. Expanding such spaces—through public, private, or hybrid initiatives—could ease strain on public areas and promote more equitable integration of gig work into urban life. Currently, most couriers still depend on improvised, informal solutions.

5.4. Infrastructural Adaptation: Platform Responsibilities and Governance Challenges

Stockholm's current urban infrastructure is ill-equipped to accommodate the logistical demands of DFDPs. Bike lanes are often too narrow for larger delivery vehicles. Zoning regulations do not anticipate dark kitchens or mixed-use logistical spaces. As one urban planner at Stockholm Municipality put it: "We're still planning for a city of restaurants and shops. Not a city of delivery nodes and mobile kitchens" (Interviewee M1).

Planners also described being caught between long-term visions of livability and immediate logistical pressures. "We talk about 15-minute cities and reclaiming space for people, but the curb is full of mopeds and vans," said a transport official; "it's like the city is serving two masters" (Interviewee M8).

Malmö and Gothenburg have launched pilot programs to experiment with infrastructure for last-mile delivery, such as cooled parcel lockers and micromobility hubs. Gothenburg's Nordstan Mobility Hotel offers battery-swapping and storage services, reducing fossil fueled delivery in central areas. One micromobility coordinator in Gothenburg described it as a logistical service "offering space, power, and repair in one place" (Interviewee M5).

However, even promising initiatives face barriers. A freight strategist in Gothenburg noted: "These systems still rely on voluntary collaboration. We can't compel platforms to join, and we lack national guidance" (Interviewee M10).

Couriers working for DFDPs face precarious working conditions that intersect directly with urban infrastructure. Many are classified as "self-employed" and are hired through intermediaries such as Frilans Finans or Invoicery Business that invoice the DFDP company for worked hours and pay delivery workers after subtracting intermediary costs. Others are hired on short contracts by Foodora Logistics AB, Foodora's own workforce management company. The term "self-employed" is a newly emerging workforce category in Sweden that remains legally undefined and has emerged because of legal flexibilities due to deregulations of labor laws in Sweden (Westregård, 2025). A representative from a civil society organization observed: "It's outsourcing within outsourcing. The platforms avoid responsibility, and the workers are left to figure things out on their own" (Interviewee C1).

Couriers reported relying on public benches, malls, or even stairwells for rest and protection from weather. One courier interviewed explained: "There's no base, no break. We go where the app sends us, and we wait wherever we can" (Interviewee G6). During fieldwork, we observed gig workers park their moped on bicycle paths to rest in the public parks, or stop on the bicycle path to talk with colleagues (Figure 3).

These patterns reinforce infrastructural inequality. Public space becomes a substitute for private infrastructure, but without coordination or care. As a Malmö food inspector explained: "This is a food system that depends on the streets—on the public realm—but no one is responsible for maintaining it" (Interviewee M8). Some municipal staff recognized the gap but questioned whether public space should accommodate labor needs. This reflects a tension between the informality of platform work and the expectations of formal spatial planning.

Figure 3. Delivery workers parking or stopping on bicycle paths to take a pause.

5.5. Emergent Municipal Strategies and Anticipatory Governance

Despite these challenges, municipalities are beginning to experiment with governance approaches to better manage DFDPs. Stockholm is implementing new regulations on curb space and piloting mobility hubs. Gothenburg is considering integrating DFDPs into broader logistics partnerships. Malmö is testing food-sharing schemes and sustainable last-mile pilots within its innovation platform.

These efforts reflect early-stage anticipatory governance, where cities begin to prepare for future socio-technical developments rather than merely react to them. Yet, many of these strategies are isolated and lack institutional anchoring. They often emerge from temporary projects, specific departments, or individual civil servants, rather than through coordinated, long-term planning strategies.

Interviewees frequently pointed out the fragmentation of municipal structures as a key limitation. A food inspector in Malmö remarked: "We talk to transport. We talk to planning. But there's no unit for platforms. No single door to enter" (Interviewee M8). This fragmentation hinders the development of coherent responses, leading to inconsistent policies and unclear responsibilities.

Some cities are exploring public–private dialogue with DFDPs, though trust is limited. One planner at Stockholm Municipality noted: "Some platforms are open to collaboration. Others are opaque. It depends on the business model—and the pressure they feel" (Interviewee M9). Where collaboration does occur, it is often informal and not linked to enforceable outcomes.

A key lesson from these strategies is the need for integrated planning. Platforms affect multiple systems—mobility, labor, food access—but are often addressed in isolation. As the regulatory gap widens, municipalities must build institutional capacity to govern platforms not just as digital services, but as infrastructural actors embedded in the everyday fabric of the city.

Embedding platform governance into anticipatory governance frameworks means going beyond one-off pilot projects. It requires cross-sectoral collaboration, national–municipal coordination, and legal reforms that create clear responsibilities and rights for all actors—including gig workers. Cities will also need to develop tools for managing hybrid infrastructures, supporting informal uses of public space, and ensuring that infrastructural burdens and benefits are more equitably distributed.

In this context, anticipatory governance is not only about forecasting future challenges—it is about redesigning governance systems to accommodate, regulate, and shape rapidly evolving urban technologies. The future of platformized urban food systems depends not only on technological innovation but on institutional imagination and political will.

Together, these findings demonstrate that DFDPs not only disrupt but increasingly define the spatial and infrastructural logic of the city. Their informal infrastructures, operational opacity, and policy evasiveness challenge traditional governance—and demand a shift from reactive regulation to strategic integration within the urban planning domain.

6. Discussion

The findings underscore that DFDPs are not peripheral actors but central to the reconfiguration of urban infrastructure, labor, and governance. This section discusses the empirical results from Stockholm, Gothenburg, and Malmö.

6.1. Hybrid Food Infrastructures and the Governance Gap

The empirical data points to the reliance of DFDPs on what can be understood as hybrid food spaces and infrastructures (as described in Fodor, 2021): physical systems like kitchens, fulfillment centers, micro mobility vehicles, and informal rest zones, tightly interwoven with digital infrastructures that manage ordering, tracking, algorithmic labor coordination, and dynamic pricing. These assemblages do not operate within conventional regulatory frameworks or urban planning structures within the city organization.

Instead, they form what Fodor (2021) describe as "hybrid urban food environments"—configurations that blur the lines between public and private, digital, and material, consumption and production. As our empirical material shows, this hybridity manifests through ghost kitchens situated in industrial zones or economically deprived urban areas, mopeds parked informally in green areas, and couriers using benches or malls as temporary resting stations. Moreover, Fodor (2021) emphasizes that the governance of these infrastructures is equally hybrid: While platforms coordinate labor and logistics algorithmically, they externalize many spatial and social costs to public space and municipal systems. The logistical rhythms of food delivery—dictated by app interfaces, peak-time algorithms, and dynamic demand—interact with street-level realities in unregulated ways. This results in new pressures on bike lanes, pedestrian zones, and transit nodes, particularly in multifunctional central spaces. These hybrid infrastructures challenge the conventional boundaries of urban planning (Andersson et al., 2022). They are infrastructural in function but informal in regulation, often escaping the visibility of planners and policymakers. While delivery platforms profit from the flexibility and invisibility of these systems, their operation relies on the availability of public infrastructure that has not been designed—or governed—with platform labor in mind. Understanding DFDPs through the lens of hybrid food infrastructures allows us to recognize how digitalization restructures not only consumption but also the very spatial and infrastructural logic of urban food systems. These tensions are particularly of high importance in Stockholm, a city that has explicitly committed to goals of accessibility, climate-neutral mobility and city logistics, and spatial equity—outlined in strategic visions such as the Accessibility Strategy and Vision 2040—Stockholm of Opportunities—which emphasize reducing car dependency, strengthening local neighborhoods, and creating a more inclusive urban environment (Stockholm Chamber of Commerce, 2023). Yet, municipal authorities face increasing difficulties in governing the infrastructural impacts of DFDPs. Dark kitchens—facilities that prepare food exclusively for delivery without serving customers on-site—are often located in industrial and commercial zones, altering local transport patterns. The clustering of food delivery couriers at transit hubs, along with conflicts over their use of bike lanes, highlights emerging tensions between platform operations and existing urban infrastructure, as also shown in other studies (Fuentes et al., 2022; George & Tomer, 2022a; Heidenstrøm & Hebrok, 2022). Municipal departments—from traffic and planning to food inspection and public space management—struggle with fragmented responsibilities for the impacts of DFDPs on urban life, insufficient legal tools, and limited data access (Rosales & Haarstad, 2023; Secchi et al., 2024).

An overview of these interconnected challenges and policy gaps is presented in Table 2, which summarizes the dynamics and governance barriers we observed across key themes—from hybrid infrastructures and platform logistics to labor precarity and municipal fragmentation.

6.2. Digital Food Provisioning and Platformized Urban Space

DFDPs have introduced new spatial actors into cities—most visibly, gig workers—whose presence now marks the everyday experience of urban life in places like Stockholm. These workers are deeply embedded in the rhythms of the city, using bike lanes, parking spaces, and sidewalks, and shaping how public infrastructure is accessed and appropriated. As one urban planner from Stockholm Municipality observed, "They are even creating informal parking or gathering spots out of places that were never meant for such uses" (Interviewee M6). Through their movements, pauses, and routines, gig workers are creating new spatial assemblages—dynamic, improvised infrastructures that have emerged without formal planning but are now central to platform-mediated food delivery. These spatial formations reproduce what Graham and

Table 2. DFDP impacts and urban governance themes.

Theme	Observed Dynamics	Governance Challenges
Hybrid Infrastructures	Informal parking hubs, rest zones under bridges, gig worker mobility tools vary by availability	Lack of zoning, absence of support infrastructure, no regulation of vehicle types
Platformized Logistics	Distributed fulfillment centers, fragmented courier networks	Difficulty in coordination; uneven distribution of impacts
Public Space Conflicts	Informal use of benches, plazas, and sidewalks for waiting and parking	Platforms not required to pay or permit, uneven treatment compared to brick-and-mortar
Data Opacity	No data-sharing requirements; invisible flows of goods	Limited municipal capacity for anticipatory planning
Labor Precarity	Informal, outsourced employment, workers responsible for infrastructure	Cities lack jurisdiction over labor models, mismatch between spatial and labor policy
Emergent Municipal Responses	Pilot programs, mobility hubs, cross-department talks	Fragmented responsibilities; siloed departments, informal governance structures

Marvin (2002) described as splintering urbanism, where infrastructure development favors consumption zones while the logistical and social burdens of provision are externalized to less privileged or multifunctional urban areas. In Stockholm, while food is delivered to affluent neighborhoods, the couriers' presence, noise, and infrastructural strain are often concentrated in busy central zones or overlooked public spaces. These workers rely on informal arrangements—sheltering under bridges, resting in mall entryways, or parking in green areas, which creates various tensions with the original purposes of these structures. The absence of designated rest infrastructure not only reflects a planning blind spot, but also reinforces infrastructural inequality.

DFDPs in Stockholm thus act not only as logistics providers but also exhibit a spatial agency that materially reshapes the city. Interviews with municipal officials reveal growing frustration that DFDPs exploit public infrastructure—benches, curbs, bike lanes—without contributing to its upkeep or regulation. For platform companies, this usage is framed as incidental or external to their operations, a byproduct of gig workers' individual choices. But the cumulative effects are unmistakable: clusters of mopeds near restaurant zones, informal courier hubs under bridges, and sidewalk congestion near delivery hotspots. These practices align with what Shapiro (2021) terms infrastructural surplus—the value platforms derive by embedding their operations within the urban landscape while displacing infrastructural costs onto workers and municipalities. Shapiro identifies two mechanisms: reformatting, where public space is repurposed as logistical infrastructure, and transactional exclusion, where gig workers absorb the full cost of vehicles, phones, charging, and waiting space. Both are visible in Stockholm, where couriers contribute with additional unpaid labor and own devices, and cities struggle to manage spatial conflicts and regulatory gaps. Civil society actors point to the inconsistency: Restaurants must apply and pay for permits to place tables on sidewalks, while platforms operate logistics functions on the same pavements without formal arrangements. This lack of parity reflects deeper institutional limitations in planning frameworks that were not designed for platform economies.

Malmö and Gothenburg have started experimenting with integrated approaches, like food policy councils and logistics partnerships, but these remain fragmented. In Stockholm, informal arrangements dominate, risking the quiet privatization of public infrastructure by platforms. Fieldwork shows that improvised courier hubs often spark resident resistance, underscoring the need for equitable planning that balances worker, resident, and city needs. Regulating platforms requires recognizing their role in reshaping urban space—and holding them accountable.

6.3. Informal Urban Systems and the Rise of Hybrid Infrastructure

A key finding is the emergence of hybrid infrastructures—informal, mobile assemblages of people, vehicles, and public space shaped by gig workers' daily practices. Unlike traditional logistics hubs, they evolve dynamically, reflecting the needs of a labor force often ignored in planning. In Stockholm, this includes couriers resting under bridges, waiting near malls and transport hubs, and charging e-bikes at public sockets.

Gig workers create infrastructure through improvisation, using bikes, mopeds, and e-scooters chosen for affordability over regulation. Workers manage maintenance, fueling, and parking themselves, with little support from platforms or cities. These practices form urban phenomena—highly visible in places like Odenplan and Medborgarplatsen, yet largely invisible to institutions.

These hybrid infrastructures are not just functional—they are precarious. Lacking rest areas, toilets, shelter, or legal parking, gig workers support the city without being accommodated. While restaurants pay to use public space, DFDPs shift such costs onto workers who rely on benches and sidewalks. This paradox—essential labor in overlooked spaces—highlights a gap in how infrastructure is governed today.

Theoretically, these infrastructures reveal the entanglement of material systems, labor geographies, and digital coordination. They challenge the idea of infrastructure as fixed and centralized, urging planners to rethink how infrastructural actors are defined and supported.

As Stockholm confronts DFDP growth, recognizing these informal systems is vital. They expose how cities serve—or fail—a mobile, precarious workforce. Hybrid infrastructures reflect both the adaptability of platform urbanism and the vulnerabilities it creates. Comparing Stockholm with Gothenburg and Malmö provides insights into potential governance pathways (Table 3). Malmö's inclusion of platforms in developing a mission-based food policy strategy and Gothenburg's Mobility Hotel suggest more proactive, anticipatory responses. Stockholm's interventions remain largely reactive.

6.4. Linking Theory to Practice

The study uses spatial inequality, platform urbanism, and anticipatory governance to examine how DFDPs reshape infrastructure, labor geographies, and governance (see Table 4). These frameworks help interpret the findings and inform future planning.

Rather than a clear center–periphery divide, DFDPs have nonlinear spatial effects. While serving affluent areas, courier activity—parking, resting, clustering—concentrates in mixed-income or high-traffic zones like Odenplan and Medborgarplatsen. These public spaces, not designed for logistics, become informal hubs, creating tensions among urban users.

Table 3. Comparative insights: Stockholm and other major Swedish cities.

City	Key DFDP Challenges	Promising Practices	Policy Learnings
Stockholm	Informal hubs, lack of data, siloed departments	Moped parking ban, curb space reallocation for deliveries, updated traffic and street use regulations for DFDP-related mobility management	Improve coordination, build anticipatory governance capacity
Gothenburg	Fragmented actors, low platform transparency	Nordstan Mobility Hotel for repair and charging of delivery vehicles, freight integration forums for coordination between DFDPs and logistics actors, sustainable delivery support	Integrate platforms into logistics planning
Malmö	Limited courier infrastructure, focus on pilot projects	Innovation procurement for sustainability-aligned platforms (e.g., local and organic food delivery), engagement through food-sharing networks, participatory planning platforms for urban innovation	Build formal channels for DFDP dialogue and cross-sector action

This complexity extends conventional understandings of spatial inequality. It highlights how public infrastructure is co-opted in uneven ways—with more visible and vulnerable forms of labor, such as gig work, relying heavily on unregulated and unsupported urban space. The appropriation of public benches, sidewalks, and bike lanes reveals not only the gaps in municipal regulation but also the urban invisibility of the very workforce that enables platform convenience.

Platform urbanism, in this light, reveals how DFDPs act as infrastructural actors without formal accountability. They repurpose public infrastructure—benches, curbs, pedestrian zones—into logistical assets, while remaining legally distant. This aligns with research in cities like Barcelona and Berlin, where informal infrastructures (such as courier hubs and gig worker clusters) have also emerged around transit zones and food delivery corridors, often outpacing municipal regulatory adaptation (Caprotti et al., 2022; Van Doorn, 2017)

Meanwhile, anticipatory governance appears to be underdeveloped. While pilot projects exist—like Stockholm's moped ban, Gothenburg's mobility hotel, or Malmö's food-sharing programs—these efforts are piecemeal and disconnected, often lacking long-term institutional anchoring.

Table 4. Linking theory to empirical insights.

Theoretical Lens	Analytical Focus	Empirical Illustrations
Spatial Inequality	Who benefits and who bears infrastructural burdens	Delivery benefits in affluent areas; pressure on public space, bike lanes, and green areas elsewhere
Platform Urbanism	How DFDPs reconfigure governance and spatial norms	Emergence of informal infrastructures in public spaces; unregulated appropriation of urban amenities
Anticipatory Governance	How municipalities respond (or fail to respond) to platform transformations	Isolated pilot projects, lack of coordination, and fragmented oversight across departments

These theoretical lenses make visible the interplay between mobile labor, digital coordination, and underregulated urban systems. They also provide a starting point for designing policies that are more inclusive, forward-looking, and spatially responsive.

To effectively govern digital food provisioning, cities like Stockholm must move beyond fragmented, reactive responses and adopt coordinated, cross-sectoral governance approaches. This includes formally recognizing hybrid infrastructures, integrating gig workers into urban planning considerations, and embedding DFDPs into environmental zones and mobility strategies to decrease emissions and congestion in inner city areas. Moreover, detailed plans indicate places for dark stores and dark kitchens and clarify in what category they are included, for example whether they are considered warehouses or shops.

Anticipatory governance offers a compelling framework: Rather than managing disruptions after they emerge, cities can co-shape platform-mediated urban futures through collaboration, institutional foresight, and adaptive policy tools. In doing so, Stockholm can shift from containment to design—planning not only for operational efficiency, but also for social fairness and spatial inclusion.

Stockholm's experience with DFDPs illustrates the stakes of contemporary platform urbanism. Comparative insights from Malmö, Gothenburg, and international cases underline the urgent need for integrated, inclusive urban governance—one capable of managing the evolving spatial, infrastructural, and labor dimensions of digital food systems while promoting infrastructural justice.

7. Conclusion: Reclaiming Urban Futures in the Platform Age

This study has examined how DFDPs are reshaping the infrastructural and spatial dynamics of Stockholm. Anchored in the theoretical lenses of spatial inequality, platform urbanism, and anticipatory governance, it has traced how DFDPs influence not only food logistics but also urban labor, mobility, and the everyday use of public space. By focusing on Stockholm, Malmö, and Gothenburg as empirical cases, and drawing on interviews, field observations, and policy analysis, the study has surfaced the multiple ways in which platform economies challenge the governance capacities of cities.

DFDPs are central to urban transformation, repurposing public space for logistics and creating hybrid infrastructures built on informal labor and mobility. They shift operational costs onto workers and cities. In Stockholm, informal courier hubs around places like Odenplan and Medborgarplatsen show how public infrastructure is used without formal support. Gig workers depend on benches, malls, and sidewalks to work—highlighting both reliance on and exclusion from urban infrastructure.

Despite some pilot efforts, municipal responses remain fragmented due to data opacity, unclear mandates, and the hybrid nature of DFDPs. While platforms scale quickly, public authorities struggle to adapt tools, strategies, and institutions. This gap fuels infrastructural tensions and poses broader challenges for equity, sustainability, and democratic urban development.

To address these challenges, urban governance must shift from reactive containment to proactive and inclusive planning. DFDPs must be treated not simply as digital service providers, but as infrastructural actors whose operations shape the urban environment. This calls for:

- Embedding platform governance into city-wide freight, mobility, and food system strategies;
- Creating regulatory frameworks that include data-sharing obligations and public space accountability;
- Developing infrastructure that meets the needs of gig workers—such as rest areas, parking zones, and logistics hubs;
- Coordinating municipal and national policies to better regulate platform labor and mitigate precarity.

Our findings show that urban food policies must address digital platforms as part of the food system—by regulating labor conditions, ensuring data access, and integrating platform logistics into sustainable planning. This research supports anticipatory policymaking, including courier hubs, data-sharing rules, and inclusive logistics zoning. It also informs debates on labor rights and digital infrastructure, with implications for public space and urban quality of life. Commercially, it offers guidance for more socially responsible platform operations.

Grounded in data from Stockholm, Malmö, and Gothenburg, the study could be expanded through cross-city comparisons to explore how different governance systems shape DFDP responses. Future research should continue engaging directly with platform workers and communities—participatory design is key to equitable infrastructure.

Planning for DFDPs is not just logistical but political. As platforms embed in city life, their responsibilities must become visible and accountable. Recognizing DFDPs as infrastructure enables more just, inclusive, and resilient urban governance.

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Supplementary Material

Supplementary material for this article is available online in the format provided by the authors (unedited).

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Food Business Owner Perspectives on Meal Delivery Platforms in Belgium: A Qualitative Investigation

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Abstract

Reflecting global trends towards food retail digitalisation, meal delivery platforms such as Uber Eats have operated in Belgium since at least 2016. These platforms enable registered food businesses to sell ready-to-eat meals online. How such partnerships impact the function of food businesses in urban areas is poorly understood. This is critical given concerns that meal delivery platform business models support unfair levels of competition between international food corporations and independent food businesses. Based on 21 in-person interviews with the owners or managers of restaurants and takeaway food businesses, we describe how meal delivery is (re)shaping food retail in the region of Flanders, Belgium. Owners and managers informed us that meal delivery platform registration allows them to meet consumer demand. Nevertheless, online orders only supplement continued in-person ordering and dining. During busy periods, food businesses prioritise customers visiting their brick-and-mortar location by temporarily removing themselves from meal delivery platforms. Furthermore, they typically pass on "excessive" and "unfair" meal delivery platform commission fees to consumers through inflated online prices. The evolution of meal delivery platforms has encouraged the development of dark kitchens, where meals are prepared inside non-customer-facing locations and sold exclusively online. Monitoring the development of these facilities and the broader meal delivery system is needed to understand implications for urban areas. Food accessibility measures and definitions should continue to include brick-and-mortar food business locations. They must also consider variation in availability and price across neighbourhood and digital food environments according to the time of day.

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Keywords
food environment; food retail; food systems; meal delivery platforms; qualitative research; urban planning

1. Introduction

Meal delivery platforms facilitate the ordering, payment, and delivery of ready-to-eat meals. With the operations of such platforms extending across urban areas internationally, they are now considered one component of the commercial determinants of health influencing population-level availability of meals prepared out-of-home (World Health Organization Regional Office for Europe, 2021). These companies are estimated to achieve a global revenue of €425 billion in 2025, with the number of users set to reach 2.5 billion by 2029 (Statista, 2024). More than 60% of this user base is in Asia, with 12% in Europe and 10% in North America. While various meal delivery platforms exist, Just Eat Takeaway.com (formed from the merger of Just Eat and Takeaway.com in 2020) is considered the market leader in multiple countries (Statista, 2024). According to their annual reports, 85,000 food businesses across Northern Europe (Austria, Belgium, Denmark, Germany, Luxembourg, Poland, Slovakia, Switzerland, and The Netherlands) were registered with them in 2023, a growth of 8% compared with 2022 (Just Eat Takeaway.com, 2024). The Covid-19 pandemic is likely to have accelerated this companies growth and further established meal delivery platforms as a ubiquitous global phenomenon contributing to ongoing food retail digitalisation (Cummins et al., 2020).

The growing meal delivery sector and increased number of food businesses offering online ordering have contributed to concern for the future of food retail and the ways that individuals interact with urban living spaces (World Health Organization Regional Office for Europe, 2021). It is plausible that food businesses no longer need to operate from a customer facing brick-and-mortar location and instead choose a site with lower associated costs in areas not appropriately equipped to manage stress from aspects of food retail. This relocation introduces system-wide implications, including for levels of noise, pollution, and traffic and road safety. Additionally, there are likely to be impacts on the design and function of designated retail areas. The vitality and viability of these spaces could be undermined due to empty retail units and the emergence of unfavourable businesses such as betting shops, which would limit economic success and the quality of life for residents (Macdonald et al., 2018; Marek et al., 2021). Despite recognised concern, only limited aspects of the meal delivery platform business model have been investigated to date (Granheim et al., 2022). For example, it has been reported that meal delivery platforms tend to be used by younger adults who are typically motivated by convenience, with inconsistent evidence regarding their levels of education and income (Gupta et al., 2024; Keeble et al., 2022). These platforms also increase the geographic availability of energy-dense and nutrient-poor meals by allowing customers to purchase from food businesses that are not necessarily located in their neighbourhood food environments (Brar & Minaker, 2021; Hoenink et al., 2023). Moreover, delivery drivers report that their contracts are precarious and that they engage in unsafe travel behaviour to meet time-related delivery responsibilities (Aguilera et al., 2022). Notably, the perspectives of food businesses have rarely been considered.

One of the few studies to focus on food businesses was undertaken in the USA and investigated reasons for registration and how this impacted kitchen processes and operations (Traynor et al., 2022). Food business owners believed that although registration expanded their customer base and generated revenue, commission fees (paid by food businesses when they receive an online order, based on its value) limited

profitability. Moreover, owners adjusted their kitchen processes to accommodate online orders. Owners of food businesses not registered with a meal delivery platform recognised that online orders provide income, but having limited kitchen space prevented their registration. These insights are supported by qualitative findings of sociological research in Belgium that examined how meal delivery platforms are the primary beneficiaries of the connections between food businesses and customers that they create (Franke & Pulignano, 2023). In this research, food business managers stated that registration led to increased workloads for staff since they must prepare online orders and manage and maintain online menus, promotions, and reviews.

Beyond these examples, little is known about the relationships between food businesses and meal delivery platforms. Moreover, it is possible that consumer demand for in-person ordering and dining has reduced due to meal delivery platform use, potentially impacting food businesses not registered to accept online orders. As a result, the rationale for meal delivery platform registration and its influence on food business operations, revenue, and profitability are poorly understood, especially in Belgium and at a time when meal delivery coexists with in-person ordering and dining without restriction. Developing this knowledge is vital since many aspects of daily life have become digitalised, including food purchasing through a growing platform economy. This digitalisation and platformisation has broad implications for the future of food retail and food systems that now span physical and digital spaces (Sadowski, 2020; Shapiro, 2022). From an urban planning theory perspective, meal delivery platform availability and the digitalisation of food retail challenges concepts linked to proximity and spatial allocation that traditionally inform the most appropriate location for food businesses based on knowledge about demand, economic need, and existing road infrastructure (Barns, 2019). Therefore, we aimed to gather the perspective of food business owners and managers to better understand the direct and indirect benefits and consequences of engagement with meal delivery platforms. Given that these platforms are now a major component of modern food retail that can impact the design of urban areas and the distribution of food-related activities and retail, such knowledge will be beneficial for multiple disciplines, including urban planning, transport, and public health.

2. Methods

2.1. Research Reporting Guidelines

We used the Consolidated Criteria for Reporting Qualitative Research checklist to guide the development of our research and to report our findings (Tong et al., 2007).

2.2. Ethical Approval

The Ethics Committee for Social Sciences and Humanities of the University of Antwerp approved our research (ref: SHW_2024_35).

2.3. Methodological Orientation and Researcher Reflexivity

Our research had an interpretivist orientation, not based on existing theory. By positioning participants as expert knowledge informants, we investigated their opinions about meal delivery platforms in the context of their broader business-related roles (Lincoln et al., 2011). Our multi-disciplinary research expertise across

public health and urban planning informed our collection, analysis and interpretations of the data we collected. For example, we especially focused on urban area function, vitality, and viability, and individual-level food accessibility.

2.4. Research Setting

We completed fieldwork between April and July 2024 in the cities of Aalst (~88,000 population), Ghent (~265,000 population), and Antwerp (~530,000 population), located in the region of Flanders, Belgium (Statbel, 2025). Meal delivery platforms operated in each city throughout our fieldwork.

2.5. Sampling Frame Development and Food Business Identification

We developed a sampling frame that included two groups of food businesses selling ready-to-eat meals. The first group were currently registered with at least one meal delivery platform and the second group were not currently registered. To generate a list of food businesses in Aalst, Ghent, and Antwerp, we searched the name of each city in the leading meal delivery platform in Belgium (Just Eat Takeaway.com) and OpenStreetMap (OSM). For the latter, we used tags related to food retail and delivery, such as "amenity = fast_food." While OSM data provides an accurate directory for food business identification (Pinho et al., 2023), we complemented these data with information from Google to verify food business contact details, opening hours, and addresses. We did not include international food chains such as McDonald's in our sampling frame because meal delivery platform registration is not necessarily the decision of local franchisees. Furthermore, any negative consequences of registration are likely to be offset by the chain's global prominence.

2.6. Recruitment Procedure

As with previous research (Zhang et al., 2024), we believed that food business owners or managers would be best placed to report if and how meal delivery platforms influence their operations and finances, employees, customers, and broader urban areas. The lead author (MK; a white male, native English speaker, trained and experienced in conducting qualitative research) purposefully visited food businesses from our sampling frame in-person, on a sequential basis. During visits, MK first asked for permission to communicate in English (while speaking Dutch), and when allowed, introduced himself as a researcher. After establishing an initial relationship, and only when staff members were willing to engage, MK outlined the aims of our research and participation requirements. On the same day, MK followed up via email. This email summarised the visit, provided written information and asked if the owner or manager would participate. MK sent a second email after five working days when there was no response to the first email and recorded recruitment as being unsuccessful when there was no response to the second email. We did not offer an incentive for participation.

2.7. Data Collection

2.7.1. Topic Guide Development

Before starting data collection, we developed a topic guide based on our research aims and existing evidence (Overvelde et al., 2024; Traynor et al., 2022). MK used our initial topic guide in one pilot interview

with the owner of a food business in Antwerp that was not currently registered with a meal delivery platform. We refined our topic guide based on the pilot interview and throughout data collection to ensure that questions were understandable and so that salient topics from early interviews were later included (see the Supplementary Material for an overview of topics).

2.7.2. Semi-Structured Interviews

MK conducted one-off semi-structured interviews in-person. Participants provided written informed consent before the start of the interview and agreed for conversations to be audio-recorded. MK used our topic guide as the basis for data collection and asked probing and follow-up questions to elicit deeper responses and seek clarification. Immediately after each interview, MK completed a written reflection that included possible topic guide amendments and immediate interpretations of collected data.

2.8. Data Analysis

An external company transcribed interview audio recordings verbatim. MK reviewed each transcript while listening to the corresponding recording to confirm its accuracy and made corrections where necessary. Participants did not review the transcript from the recording of their interview. Although this exercise facilitates credibility, we did not feel that our already collected data required clarification (Birt et al., 2016). LT also listened to the audio recording from each interview.

Using NVivo version 14 to manage data, MK led reflexive thematic analysis to generate codes and themes from collected data. This analytic approach encourages researchers to acknowledge their active role in data collection and interpretation (see Section 2.3), is not linked to a single theoretical position, and does not necessarily align with the development of a codebook *a priori* (Braun & Clarke, 2024). In practice, MK read each transcript on multiple occasions and used a combination of deductive and inductive coding, driven by our research aims and collected data, respectively. MK identified and noted similarities and differences in the rhetoric of participants by coding for semantic and latent meaning, acknowledging that the latter extends beyond description to identify underlying perspectives (Naeem et al., 2023). In turn, MK grouped generated codes into themes, which provide an extensive summary of interrelated topics discussed with participants during data collection. MK met with LT throughout analysis to discuss findings and interpretations. The purpose of these meetings was to establish credibility and dependability via debriefing that built on the experiences and perspectives of MK as the researcher responsible for data collection and analysis (Lincoln & Guba, 1985). After around 17 interviews, MK believed that collected data appeared to provide thematic depth to the topics of focus in our research. Following four additional interviews, MK and LT concluded that limited new information or "rich" (i.e., quality) data were provided and therefore ended fieldwork (Malterud et al., 2015; Saunders et al., 2018).

3. Results

3.1. Data Overview

Between April and July 2024, MK conducted 21 semi-structured interviews with owners or managers of food businesses located across Aalst (n = 3), Ghent (n = 10), and Antwerp (n = 8). Of these interviews, 20 took

place inside the food businesses of participants, six were open to customers, and 14 were closed at the time. One interview was held in public. Interviews lasted between 21 and 52 minutes. Table 1 provides information about the food businesses from which we recruited participants. Of these food businesses, 14 were currently registered with at least one meal delivery platform and seven were not. Beyond those recruited, we did not receive a response to 135 initial emails sent after in-person visits and nine food business representatives chose not to participate, with no reason provided.

Table 1. Characteristics of food businesses in Aalst, Ghent, and Antwerp from which owners or managers were recruited between April and July 2024.

Ref	Meal delivery platform registration status	Time since registration	Cuisine of meals sold
P1	Registered	3.5 years	Sandwiches
P2	Not currently registered	—	Belgian
P3	Registered	8 years	Sushi
P4	Registered	7 years	Italian
P5	Not currently registered	—	Indonesian
P6	Registered	7 years	Sushi
P7	Registered	2.5 years	Spanish
P8	Not currently registered	—	Salads, sandwiches, soups
P9	Registered	4 years	African
P10	Registered	4 years	Pita, kebabs, wraps
P11	Registered	6 years	Spaghetti
P12	Not currently registered *	—	Japanese
P13	Not currently registered *	—	Salads, sandwiches, soups
P14	Registered	5 years	Frituur
P15	Registered	2 years	Soups, sandwiches
P16	Not currently registered *	—	Pizza
P17	Registered	6 years	Southeast Asian
P18	Registered	3 years	Italian
P19	Not currently registered *	—	Soup
P20	Registered	3 months	Salads, sandwiches, soups
P21	Registered	6 years	Fish and chips

Notes: We do not report the city of food businesses to help protect their anonymity. Food businesses not currently registered may have been registered in the past (*). A Frituur sells traditional Belgian fried food.

3.2. Generated Themes

We generated four themes: Rationale for registration; Incurring and offsetting commission fees; Managing benefits and consequences; The future of food retail. Next, we present each theme with supporting verbatim quotes from participants, according to their reference number.

3.2.1. Rationale for Registration

There was a common opinion across all owners and managers that meal delivery platforms are now embedded in society. As a result, their registration was underpinned by an opportunity to meet consumer demand. As each different meal delivery platform was seen to have its own set of users, simultaneous registration with more than one was a strategy to enhance opportunities to receive online orders:

> I think these services are really answering the needs of people. It would be stupid to stop because if we stop, we'll lose part of our revenue. (P15)

Participants reported that opportunities to receive online orders had been made especially attractive by meal delivery platform representatives before and during registration. These representatives positioned meal delivery platforms as being flexible and that online orders would complement existing business functions:

> The way they sell it is to make extra—like it's not a core business, it's for the quiet moments to have a little bit of extra turnover. (P17)

Owners and managers from food businesses not registered with meal delivery platforms appreciated that they sacrifice "extra turnover" and were aware that their competitors had registered. Nevertheless, they felt that registration was unnecessary because they were satisfied with existing levels of revenue and profit. Furthermore, they wanted to focus on customers visiting their brick-and-mortar locations so that they could provide them with the best possible experience. Limited time to manage additional orders further supported their decision not to register:

> I'm happy with the customers that I have. All of my customers are returning customers. I have a dozen or more daily customers even during summer. I don't need the extra that I would make by using any kind of delivery. (P19)

3.2.2. Incurring and Offsetting Commission Fees

All owners and managers had an opinion about meal delivery platform commission fees. Some reported that the "crazy fees" were unfair and unjustified, with some positioning the platforms as being "greedy," "thieves," and a "disease":

> They said, 25–30% but if you add all the costs, you come to about 40%. It's just stupid. You don't need so much to run that business. It's just greed. Simple greed. (P6)

Such negative language reinforced a common perspective that paying commission fees had to be tolerated rather than approved. In contrast, a more positive point of view reflected that paying commission fees had been accepted since it was necessary to access meal delivery platform infrastructures. In an attempt to limit financial losses due to these fees, most owners and managers from registered food businesses increased prices for online orders. However, this was only possible when their prices were ordinarily affordable. Increasing higher than typical food prices would risk losing customers to competitors:

> We're using quality products and we do everything homemade, so our cost is already a lot. We're not in the cheap range of price for casual food—we're more in the high range of prices. If you see the offer on Uber Eats, we cannot also add 30% extra on our price. (P18)

3.2.3. Managing Benefits and Consequences

We generated four interconnected and overlapping sub-themes that captured how meal delivery platform registration can provide benefits and consequences for food businesses and their staff that are either realised or expected: Impacts of demand; Further stress for staff; No longer having full control; Customer focus.

3.2.3.1. Impacts of Demand

Although online orders are typically received at regular mealtimes (i.e., lunch and dinner), owners and managers are not always able to anticipate the specific days they will arrive or their volume. They viewed this unpredictability as being different from demand for ordering and dining at their brick-and-mortar locations. This was easier to anticipate due to experience accumulated over time. Furthermore, large groups of unanticipated customers were considered easier to manage due to being able to communicate face-to-face, which was not possible for online orders:

> It depends, some days we get a lot of orders through Uber, sometimes it's only one or two. So, it changes day to day. (P15)

Regarding food preparation, unexpectedly large online orders were a concern because they could mean that menu items became unavailable for other customers. Such orders also dictated the immediate tasks and priorities of staff:

> We sell little chicken skewers, but you need to make them—it takes a lot of time, and then suddenly someone orders, I don't know, 25 chicken skewers but that was all of our prep and then one order takes it all. Then, suddenly a table orders four and then another order and then on the spot, you need to start making more skewers because one guy ordered 25. (P17)

While large or unexpected online orders can be disruptive, they also generate revenue during otherwise quiet periods. Existing kitchen spaces easily manage online order preparation when there is little demand from elsewhere. Nevertheless, preparation becomes challenging when multiple orders from different purchasing modes arrive simultaneously. As a result, inadequate kitchen space can be a barrier to initial registration and inform decisions to end registration. This was especially the case after meal delivery platform registration had been trialled and the impacts of online orders on business operations experienced:

> This isn't the appropriate place to also do delivery. I only have this small counter to make the pizza, and I can't prepare big orders. It's just not manageable…but on the other hand, if I had the space, maybe I would do it just because it's extra revenue or profit. (P16)

Beyond kitchen spaces, dining areas inside brick-and-mortar locations can become overcrowded during busy periods, especially when delivery drivers arrive to collect online orders. Having these individuals wait inside until meals were ready was seen to disrupt the ambience that owners and managers wanted to create. Nevertheless, participants reported that they must operate with multiple co-existing revenue streams to remain relevant and competitive and maintain profitability.

3.2.3.2. Further Stress for Staff

Alongside their existing roles, staff working for registered food businesses were expected to find solutions for complicated or ambiguous online orders. They also had to resolve customer complaints, for example, when meals were not delivered. Such additional responsibilities were seen as a new pressure on staff time. As a result, one owner encouraged others to consider if registration was truly needed and to be wary of possible consequences:

> If you want to do it, make sure you have a lot of energy to fix the problems if they occur because a problem is easily there. Your food doesn't get delivered. People call to complain. Yeah, that's all on you, so I think be careful. Do it if you want. If you don't have to, don't do it. (P3)

Questioning registration in this manner was an ongoing process. Owners and managers acknowledged that they could choose to stop accepting online orders if and when the stress they create fails to be adequately offset by the benefit of additional revenue:

> But for me, it's just more of a headache. As long as I don't really really need them, I'm not going back. (P19)

3.2.3.3. No Longer Having Full Control

While food businesses registered with a meal delivery platform can benefit from an expanded customer base and additional revenue, owners and managers were apprehensive about not being in full control of the meals customers eventually received. They acknowledged that it was vital for customers to have good experiences so that they would become loyal and place orders again in the future:

> You give the responsibility to make it really perfect to somebody else. If you work so much in the kitchen to make it really perfect, it's difficult to give it away. I hope you do good. I hope you don't mess up. (P2)

Discussions about losing control typically involved delivery drivers. Owners and managers used empathetic language to position this group as a vital but underappreciated aspect of the meal delivery platform business model. However, since owners and managers outsourced delivery to meal delivery platforms, they believed it was unfair for their businesses to receive negative reviews if a customer received their meal later than expected or if it arrived cold or damaged:

> I mean, the bad reviews that we've had up to now are generally about the delivery, not the food. It's not our fault. There's nothing we can do. (P7)

3.2.3.4. Customer Focus

To enhance the benefits of registration, while at the same time minimising the impacts from consequences, owners and managers described compensatory strategies they had developed and adopted. These strategies primarily involved "turning off delivery" on a temporary basis so that they would not receive online orders for a given period of time. Meal delivery platforms encouraged this to manage demand, yet owners and managers were concerned that doing so meant they would not receive orders in the future given the number of alternatives that customers could choose from:

> So, if it really gets too busy in the store, we switch off the tablets. I mean, we're not very fond of it but when it's super busy, we can't afford to run behind in the store because of our delivery partners. (P14)

One participant suggested that in the future, customers may have their online choices limited to chain food businesses. These businesses can accommodate high levels of demand with no impact on their kitchen functions and customer service, can afford to employ additional members of staff to alleviate stress, and negotiate reduced commission fees that allow them to maintain already low prices due to limited concern for narrowed profit margins:

> I always think this kind of process is tailored for bigger companies and we're more in the small, personal companies that don't match this way of working. (P18)

Owners and managers also described their actions when they had online orders to prepare in addition to customers visiting their brick-and-mortar location. Customers who had put in the effort to visit them so that they could order or dine in-person were prioritised by having their meals prepared first. Such actions reinforce that meal delivery supplements core business functions and is rarely a primary focus:

> If we're busy, we have to focus on the customers inside. The Uber Eats and Deliveroo orders—they're not an afterthought, but the people coming to the restaurant, they're slightly prioritised. (P21)

3.2.4. The Future of Food Retail

We identified a sense that regardless of meal delivery platform availability, hedonic and sociocultural aspects of visiting the brick-and-mortar locations of food businesses could not be replicated through delivery. This view was most apparent when owners and managers discussed dark kitchens, which enable food businesses to prepare meals in non-customer-facing locations and sell them exclusively through meal delivery platforms. Although there was acknowledgement that the emergence of these facilities could be particularly disruptive to the future of urban food environments, they believed that food norms in Belgium that prioritise personal interactions mean they will not become widespread. As one participant stated, although meal delivery platforms are already established and apparently popular in their city, revenue generated from online orders would not allow them to operate exclusively from a dark kitchen:

> The thing I like the most about having my business is that I get to know a lot of people….Okay, the delivery services are kind of big already here, but it's nothing compared to cities like Brussels….The revenues would be too low to only have a dark kitchen. (P15)

Despite the view that dark kitchens might not yet flourish in the Flanders region of Belgium, owners and managers outlined the importance of remaining up to date with current and future trends. They believed that there is a growing demand for convenience from customers. In turn, this means customers will increasingly purchase and consume ready-to-eat meals instead of cooking at home:

> The current and new generations will use those services more and more. We've seen it grow over time, and it's not because of our product, it's just because people don't want to cook at home anymore. (P11)

Many of the owners and managers in our research were from food businesses that registered with a meal delivery platform during the Covid-19 pandemic having not previously offered delivery. Although this was somewhat forced upon food businesses as a means of survival, it is noteworthy that they successfully adapted. This is consistent with an awareness that food retail is becoming increasingly digitalised. For instance, traditional aspects such as menus are being replaced with scannable QR codes. One participant described how they had already started to consider online ways of working as part of their future:

> In the coming five years there is going to be a lot of change. I see restaurants closing….I'm thinking in the future, everything is going to be digitalised, so I'm investing in that too. (P10)

4. Discussion

4.1. Summary of Findings

Our findings provide novel information about meal delivery platforms from the perspective of food business owners and managers—an important point of view that has been under-investigated. Given increased consumer demand for online ordering, registration with at least one meal delivery platform can be seen as a strategy to generate revenue that complements revenue from orders received in-person. Commission fees that accompany online orders can detract from generated revenue and threaten profitability. Many registered food businesses pass on the cost of these fees to consumers by increasing online prices. Meal delivery platform commission fees can also be a barrier to registration and contribute to decisions to stop accepting online orders. Receiving and processing online orders was described as stressful for staff and can impact the experiences of customers visiting brick-and-mortar locations. Food business staff prioritise customers they can speak to face-to-face, with in-person dining considered a vital contributor to Belgian food culture. Given this food culture, in the context of the Flanders region of Belgium, built food environments maintain their importance for urban food retail. Nevertheless, registration with a meal delivery platform might become increasingly necessary for future survival as part of broader food system digitalisation.

4.2. Interpretation of Findings and Future Research

Our findings indicate that meal delivery platform registration does not mean that food businesses can afford to forget about the continued importance of customers visiting them in-person. Instead, registered food businesses have the opportunity to generate revenue through complementary modes of order. We identified that registration with multiple platforms enables greater customer exposure that can lead to revenue. Nevertheless, registration is not always feasible because of limited capacity in the kitchen spaces where meals are prepared. We also identified that receiving and processing online orders can be stressful for

staff, especially during busy periods of the day such as lunchtime. Our findings are supported by evidence that food business staff in Canada were expected to process and prepare online orders in addition to their existing roles, causing stress (Overvelde et al., 2024). Despite this, registration appears to be necessary for food businesses to maintain relevance within the broader food retail sector that has become increasingly competitive over time, especially since the Covid-19 pandemic. Like other forms of retail that were forced to adapt during the Covid-19 pandemic (Beckers et al., 2021), it is vital that food businesses consider if and how meal delivery platform registration will impact their kitchen operations and staff stress levels. As has been reported by food business owners in the USA (Traynor et al., 2022), solutions can be adopted to minimise this by changing cooking workflows to accommodate online orders and selling a limited number of items exclusively online.

Consistent with previous evidence from Belgium (Franke & Pulignano, 2023), we identified that food businesses increase their prices for online orders to minimise the extent to which meal delivery platform commission fees shrink their profit margins. There is a risk that meal delivery platforms become dominated by a selection of food businesses that can absorb commission fees without increasing their already low prices—namely, chain corporations who prioritise profit over health by providing cheap, energy-dense, and nutrient-poor food (World Health Organization Regional Office for Europe, 2024). Opportunities to enhance healthier food access online are already being missed and will continue to be missed in this scenario since food price is known to contribute to customer purchasing decisions (Janssen et al., 2018; Keeble et al., 2022). The overall size of the digital food environment is a recognised public health concern, especially since its scope is not constrained by geographical boundaries (World Health Organization Regional Office for Europe, 2021, 2024). Monitoring the food businesses registered with meal delivery platforms, including the number, their menus, food prices, and unique promotional offers that could influence affordability, is essential to understand how these platforms can support or hinder efforts to improve population-level dietary health.

Importantly, owners and managers reported that they manipulate the availability of their food business on meal delivery platforms during busy periods of the day. Our finding emphasises that access to food through these platforms is dynamic and influenced by factors beyond the location of and distance between food businesses and customers. This has important implications for how food accessibility through meal delivery platforms is conceptualised and measured. The current evidence base has largely failed to incorporate temporality when determining exposure and outcome measures. As demonstrated for brick-and-mortar food accessibility (Thornton et al., 2020), this is likely to misrepresent the food businesses available through meal delivery platforms. Further investigation is needed to inform how digital food accessibility is conceptualised and measured, and variation according to the time of day.

A perception that it is difficult for meal delivery platforms to replicate the sociocultural norms and hedonic values of in-person ordering and dining helps explain why we found little concern about the future of brick-and-mortar food business locations in Belgium. This is also important from an urban planning perspective since restaurants contribute to the attractiveness and retail function of towns and cities. The Belgian National Food Consumption Survey from 2022–2023 supports our finding, since results indicate that the use of meal delivery platforms may not yet be widespread. While 47% of the Belgian population aged 10 years and over reported eating inside restaurants with table service at least once per month, only 21% reported having food delivered to home (Sciensano, 2024). Opportunities to order meals prepared out-of-home in-person or through meal delivery platforms coexist. It is essential to understand the factors

that influence why and under which circumstances different modes of order are used by engaging with meal delivery platform users and non-users. Although dining inside a restaurant with others is a sociocultural norm in Belgium (Castelo et al., 2021), we acknowledge that differences across countries have scope to influence the current and future frequency of meal delivery platform use.

In Canada, meal delivery platform registration did not equate to food business survival during the Covid-19 pandemic (Wray et al., 2024). Moreover, financial statements from food businesses registered with a meal delivery platform in Belgium suggest that online orders provide revenue but not necessarily profit (Veldhoven et al., 2021). On balance, registration does not lead to economic harm for food businesses, and contributes to employment opportunities (Azzoni et al., 2025). It is beneficial for urban areas that retail units are not becoming vacant due to food business closure as a direct result of meal delivery platform availability. Nonetheless, it remains possible that the presence of these platforms impacts longer term local area vibrancy, viability, and function through increased traffic, pollution, litter, and pressures on night-time economies that are not currently observable (Bates et al., 2020; Granheim et al., 2022). Notably, these aspects of meal delivery platform availability were not a concern for the food business owners and managers in our research. Therefore, discussions with professionals and policymakers working across multiple disciplines, including urban planning, transport, and retail are required to help identify specific opportunities and threats for urban areas in the context of meal delivery.

The need for such discussions is especially relevant for dark kitchens. These facilities enable food businesses to prepare meals in non-customer-facing locations and sell them exclusively through meal delivery platforms (Thimoteo da Cunha et al., 2024). This stands to disrupt the food retail sector since dark kitchens do not need to be located in traditional business zones. Moreover, a shift in the location of food retail to areas not equipped or designed to handle related challenges has scope for broader impacts on urban living. Despite this, food business owners and managers in our research did not believe that dark kitchens would prosper in the Flanders region of Belgium because of limited online order revenue. In contrast, there is concern from professionals in many countries across Europe, including in Belgium, where urban planning policies have been adopted to prevent dark kitchen proliferation (Amies, 2022; Shapiro, 2022). The introduction of such policies emphasises a need to consider how meal delivery platforms are reshaping food accessibility across built and digital food environments.

4.3. Strengths and Limitations

We completed data collection in three cities where meal delivery platforms operate. The ubiquity of these platforms across multiple countries increases the transferability of our findings. Data collection away from urban centres may have allowed us to understand different reasons for registration and accompanying benefits and consequences for food businesses located elsewhere. Despite this, however, meal delivery platform availability is most pronounced in urban areas, limiting their relevance for food businesses located elsewhere. The lead author (MK; a white, native English speaking, male) conducted all interviews with food business owners or managers in English. These individuals were well-placed to provide insight into the financial performance of their food business and to discuss how operations were being impacted. In some instances, data collection took place when food businesses were open, which led to minor work-related interruptions and distractions. These were infrequent and did not impact our data but their occurrence is important to note. Fieldwork with this population group has been recognised as challenging (Zhang et al.,

2024), and our approach to data collection was pragmatic and appropriate given that we did not incentivise participation. Finally, English was not necessarily the native language for participants. Despite this, during recruitment, we outlined that interviews would be carried out in English, and all participants confirmed they were comfortable with this. Moreover, in line with our aims, we did not recruit waiting or kitchen staff who may have unique insight about meal delivery platforms. In addition to the data we have analysed and reported on, we engaged with the owners and managers of three fresh food businesses during our fieldwork. These individuals were most concerned about threats to their future from fruit and vegetable delivery and recipe-box subscription services, rather than meal delivery platforms. To maintain specificity, we did not include these perspectives but recognise they are under-investigated (Granheim et al., 2022). Thus, future research should consider gaining a broader perspective from across the food system. This could include, for example, other members of food business staff, other types of retailers, and urban planners. Doing so would offer a holistic view on what the presence of meal delivery platforms means for working arrangements and urban form across the food system.

5. Conclusion

Our investigation into food business owners and managers perspectives on meal delivery platforms in the Flanders region of Belgium indicates that registration is motivated by opportunities to meet consumer demand. While registered food businesses benefit from the revenue and profit generated from online orders, accompanying commission fees can lead to inflated online prices that have scope to impact food affordability. Online orders can also be stressful for staff and lead to negative customer reviews. Although meal delivery platforms are not necessarily a threat to brick-and-mortar food business locations in the context of Flanders, Belgium, their presence contributes to the overall availability of ready-to-eat meals. Continued monitoring of meal delivery platforms will help identify currently unobservable impacts, both in countries where they are already prominent and in those where they are becoming established—this will be essential to understand as food retail becomes increasingly digitalised.

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Conflict of Interests

The authors declare no conflict of interests.

Data Availability

Anonymised data collected for this research is available from the corresponding author upon reasonable request.

Supplementary Material

Supplementary material for this article is available online in the format provided by the authors (unedited).

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Urban Foods Beyond Urban Food Environments: Reflections From a Rural Village in Western Bhutan

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Abstract

This ethnographic article, based on anthropological fieldwork carried out between March 2024 and March 2025, aims to challenge the concept of urban food environments by focusing on the ways in which industrially produced foods—conceptualised as "urban foods"—and associated negative health outcomes proliferate beyond urban built spaces. In particular, it looks at the ways in which these foods penetrate what is considered a remote and rural village located in the Haa valley of the Himalayan kingdom of Bhutan, exploring the mechanisms through which local inhabitants incorporate urban foods into their long-established rural practices, shifting them from a capitalist logic of consumption to communal ethics of care. The article illustrates (through three ethnographic vignettes) and discusses how industrially produced foods become embedded in local practices and diets through social, cultural, and affective processes, suggesting that, to capture the complexity of contemporary food systems, we need to examine such processes in our analyses. We therefore need to think beyond urban food environments: firstly, issues associated with such environments have gone well beyond urban built spaces; secondly, by perpetrating the narrative predominance of the urban over the rural, we fail to notice the mechanisms that allow unhealthy urban food systems to exist, proliferate, and cause harm. This article contributes to the literature thinking beyond urban food environments by exploring some of the ways in which food spaces are constantly transforming into a (re)combination of urban and rural elements and relations.

Keywords

Bhutan; development; food spaces; food systems; Himalaya; remoteness; rural; ultra-processed foods; urban food environments; urbanisation

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1. Introduction

Dualistic ideas about the urban and the rural have been problematised by many scholars since the end of the nineteenth century. Such constructed categories have in fact become increasingly blurred or, in the words of Lefebvre (1974/1992) and Santangelo (2019), "juxtaposed," "superposed," "telescoped," and "absorbed into one another" (Burgos Guerrero, 2022). The general tendency of the past decades has been to conceptualise this blurring as a progressive expansion of the urban, with rurality viewed as a dissolving periphery. Krause (2013, p. 2) talks about "intellectual imperialism of the urbanism," referring to how most processes have been framed through the lens of urbanisation (which is often associated or used interchangeably with terms such as modernisation and development), and to how all types of social problems are now discussed as urban problems. Literature around food seems to have followed "the imperialism of the urbanism," with the predominant and expanding use of terms such as "urban food systems," "urban food spaces," and "urban food environments." Initially, discourses around "urban food" came from the need of bringing food, which had been overlooked until that point, into the urban question, and of developing strategies to achieve urban food justice, sustainability, and health in a context of widening food insecurity and social inequalities (Bedore, 2010; Cohen & Garrett, 2010; Heynen, 2006; Morgan, 2015; Morgan & Sonnino, 2010). Such approaches were fundamental in recognising issues that are still present (and perhaps increasingly so) in cities, but they can be limited in how they restrict the study of issues related to food and urbanisation to urban built environments. The implied assumption behind these kinds of analyses is that urban food environments are absolute spaces denoted by specific characteristics and issues that can be quantified and compared to rural ones (e.g., Bodor et al., 2010; Dean & Sharkey, 2011; Westbury et al., 2021). Such conceptualisation, even though necessary for certain kinds of investigations, fails to reflect the complexity of the contemporary world, where rural and urban food spaces are blurred, deeply entangled, and highly interdependent. Issues that have been associated with the urban, such as disparities in food distribution and access and incidence of noncommunicable diseases, are complex and far reaching, going well beyond urban built spaces.

More recent approaches—rather than only considering food and related issues within the city and thinking about the "urban" and the "rural" as discrete and disconnected categories—urge us to think about urbanity in a broader sense, considering how urban food influences other territories, and placing attention on territorial relationality and urban-rural food linkages (Battersby et al., 2024; Mackay, 2019; May et al., 2022; Tacoli et al., 2025). Burgos Guerrero (2022) suggested that we shift our attention on what he calls "extended urban foods spaces," focusing on the urbanisation of food and eating in terms of social-spatial transformations happening in the broader territories (physical and conceptual) being touched and produced by urban food processes. Battersby et al. (2024) highlight that the urban is crossed by important flows of materials, energy, and resources, that go within and beyond its borders. These compelling approaches allow us to move beyond conceptualisations of the city as a pre-given physical container and of urbanisation as merely physical expansion of the city over the countryside. However, they often focus predominantly on the issues related to urban food systems in what are considered urban, peri-urban, and urbanising areas, due to their rapid expansion and the fact that they are more impacted by the weight of food insecurity and malnutrition (Battersby et al., 2024).

Although the rationale for focusing on such spaces is understandable, I argue that even the most "rural" contexts are also increasingly subject to issues related to urban food systems and should therefore be further explored in this body of research, especially in their relationality and complex mechanisms relating to

urban spaces. I therefore adopt Burgos Guerrero's (2022) "extended urban food spaces" approach by focusing on the food-related social-spatial transformations associated to the penetration of the urban fabric in what is considered one of the most rural settings of the Himalayan region, which is itself perceived as remote. Although the village where I carried out my research, located in the Haa valley of Western Bhutan, is characterised by what would be conventionally considered rural food systems and lifestyles (food provision, for instance, consists mainly of subsistence farming, foraging, and cattle rearing), it has witnessed significant dietary shifts and the increasing proliferation of industrially produced food items such as flavoured instant noodles, crisps, sweets, biscuits, and sweet fizzy drinks. Many other rural areas of Bhutan and the Himalayan region—which is denoted by a huge internal heterogeneity of cultures and lifestyles, especially when it comes to food (Ansari, 2017)—are also incurring into issues associated with industrialised diets, such as the high and rising incidence of noncommunicable diseases (Atwood et al., 2014; Chhay et al., 2023; Minot & Pelijor, 2010). Industrial food products, which are generally problematic to define—terms range from "junk food" to technical definitions such as "ultra-processed foods (UPFs)," "high fat, salt, sugar (HFSS) snack food," and "sugar sweetened beverages (SSBs)"—are even more confusing and difficult to understand for inhabitants of such remote contexts, who integrate them into their local food systems and ways of life through informal and unregulated systems, and make sense of them with the limited information they have on such products.

In this article, I call these products "urban foods," to emphasise how they appear to the eyes of villagers, who mostly receive such items from vehicles and relatives coming from the city. Having never seen these products in their rural context before, they immediately associate them with urban areas such as the capital Thimphu or cities bordering with India (e.g., Phuentsholing). I also consider these foods as "urban" as they were originally designed for the city, with the idea of attracting and feeding consumers with busy office work schedules, limited time for food preparation and consumption, and high access to food stores. Although it is in itself a simplification, the expression "urban foods" plays with the urban-rural dichotomy precisely with the aim of stressing that food spaces are not fixed but composed of elements and relations that move, transform, and recombine continuously, and that phenomena and issues that are conventionally associated with the city (e.g., industrialised foods such as UPFs and HFSS snacks) circulate well beyond urban built environments. I therefore explore these foods as parts of an "urban fabric," which, in the words of Lefebvre (2003, p. 3) "grows, extends its borders and corrodes the residue of agrarian life." However, remaining critical about perpetrating the imperialism of the urbanism (Krause, 2013), I conceptualise the urban not as an extreme expanding over a continuum, neither as a centre progressively dissolving the rural periphery, but as a node in which different flows overlap, interchange and interact, creating new flows—such as the movement of UPFs and other products—which then expand beyond what is considered the city. By focusing on the circulation of urban foods in this Bhutanese context, I aim to challenge the very concept of urban food environments, showing that it fails to consider the complex social, cultural, and affective mechanisms that allow urban foods to proliferate not only within the city, but even in what are considered the most rural and remote contexts.

By speaking about the relationship between the urban and the rural in the Himalayas, this article inevitably intersects with discourses around connectivity and remoteness, which are determined by many factors including physical infrastructure as well as social relations. Saxer (2016) discusses how, especially in the Himalayan context, assumptions ingrained in the centre-periphery thinking tend to foreground a singular big transformation from tradition to modernity. Instead, he emphasises that remoteness (just like rurality) is

itself a relational condition and critically engages with the trope of the remote Himalayan village by highlighting the role of mobility, connections, and material-immaterial flows, something that I also aim to do in this article. In the below sections, I introduce the village where I carried out my research, explaining why it is commonly considered as a remote and rural setting, and how it has been transforming in the past decade (for instance, due to infrastructure development). I then delve into villagers' daily relationships with urban foods and how they relate to what are considered local and rural ones. By focusing on the social and affective processes which allow urban foods to penetrate the lives and bodies of village inhabitants, I hope to unveil some of the local practices and mechanisms that are often overlooked, but that actually determine the working of contemporary food systems. Ultimately, this article aims to contribute to the deconstruction of dichotomous assumptions that lie behind the concept of urban food environment, calling for an understanding of food spaces as shaped by social relationships which are constantly transforming in a (re)combination and reconfiguration of urbanity, rurality, connectedness, and remoteness.

2. Materials and Methods

The material presented in the article comes from ethnographic fieldwork carried out between March 2024 and March 2025 in a community of villages located in the lower part of the Haa district of Western Bhutan (see Figure 1). The community is formed of 16 villages in total; in this article, I focus on one of them, where I stayed with the same host family for over six months. During this time, I carried out participant observation with my host family members as well as with their neighbours and other villagers, focusing on their local food systems, namely on how they carried out their crop cultivation, farmwork, foraging, care of cattle, food shopping, cooking, eating, religious food offerings, and anything else concerning food. I conducted around 50 personal interviews, also focused on local food systems. This article draws on some of this material to analyse villagers' relationship with industrially produced products—which they receive from the "city" and I therefore conceptualise as "urban foods."

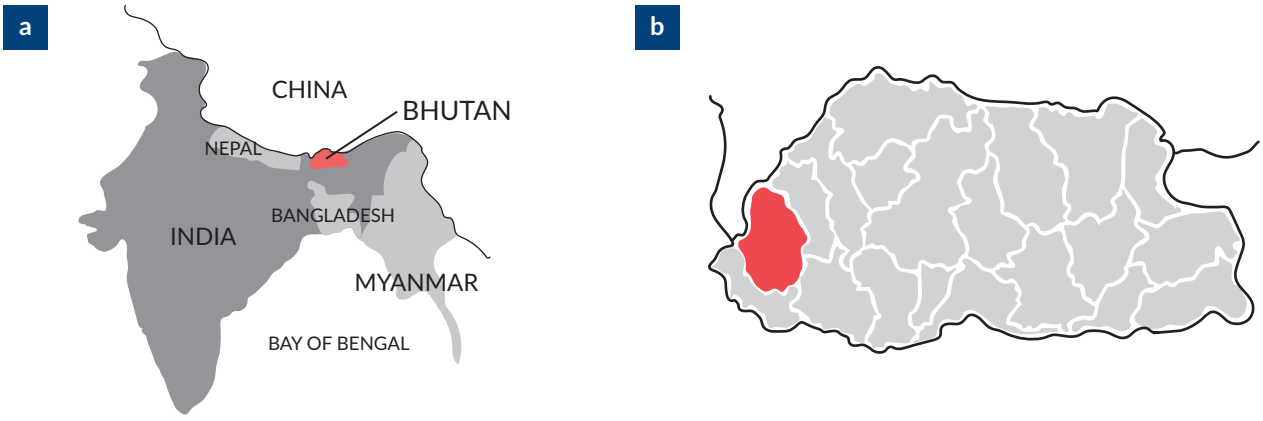

Figure 1. Map of Bhutan's bordering countries, with Bhutan (a), and Haa, the district where I carried out my research (b), highlighted in red.

In the below sections, I present this material in the form of three vignettes. Vignettes are thick descriptive narrative accounts used in ethnographic writing to zoom into details while also conveying a general picture of the field site. Beyond a dissemination form, they are "a layered practice of reinterpretation" (Bloom-Christen & Grunow, 2024, p. 798), namely a method of anthropological analysis (Creese & Takhi, 2016). I opted for

this form as it better allowed me to vividly describe and reflect upon processes that are material and affective at the same time. Such method was also useful in combining my own participant observation notes with the responses of single research participants, with the aim of imparting a broader and interconnected picture of the role of industrially produced snack foods in the village, and of how local inhabitants perceive and make sense of these products. While the proliferation of urban foods is relevant, with some differences in levels of access, to all 16 villages where I circulated during my research, I only focus on one of them for the purpose of making readers more familiar with the characters of my vignettes. Furthermore, having spent most of my time in this village, I can back up my observations with much larger and detailed quantities of data.

The research was carried out with the help of Bhutanese research assistants Chandra Kala Ghalley, Karma Choki Dema, and Mon Kumar Rai, who translated everyday conversations and interviews, facilitating discussions with villagers and helping me explore their understanding of and relationships with urban foods. In order to protect our research participants' anonymity, I refer to them using pseudonyms. I also call the village where I carried out my research the fictional name "Chimna" (which, in Dzongkha, literally means "at home").

3. Rural Villagers Incorporating Urban Foods

Chimna is a village composed of 13 households. It is located at an altitude of around 1,800m and characterised by a fertile subtropical climate, which allows its inhabitants to grow several garden vegetables, crops such as buckwheat, maize, millet and red rice, and their only cash crop, cardamom. Villagers predominantly live on subsistence farming and on the income gained from cardamom exports; most of them have a few cows on which they depend for milk (used for making their own butter and cheese); and, depending on the season, they forage various items from the forest, such as mushrooms and edible ferns. The official religion is Buddhism (which is also the national religion of Bhutan), which coexists and is mixed with animistic and shamanic practices deriving from Bon, an indigenous spiritual system that was present in the Himalayan region since before the arrival of Buddhism (Tashi, 2023). Chimna gained access to electricity in 2016, and the first road was constructed only a few years later (2018)—infrastructural developments that have enabled circulations and their accelerations, especially to and from what are considered urban areas (Chimna and the new road can be seen in Figure 2).

Before the construction of the road, it took villagers at least three days to reach the closest market on foot. This meant that most people grew almost everything that they ate and only went to the market for essential goods such as salt and to sell cardamom seeds. Road access has deeply transformed the lifestyles of most villagers, who can now ride vehicles and reach the closest market in a few hours, having easier access to cheap imported fruits, vegetables, rice and industrially produced foods. Many young people have started looking outside of Chimna for education and work opportunities, now being able to easily circulate between cities and their village. When they come to the village during breaks and holidays, they usually bring instant noodles, sweets, snacks, imported fruits and other items from the city, which they gift to their parents, relatives, and children within the family. In the past year, a hydropower project was initiated in the area, with hundreds of workers coming from all over Bhutan as well as India. A few villagers have taken this opportunity to open small shops along the newly constructed road, selling industrially produced alcoholic drinks, snack food, and other discretionary products to both workers and villagers. Following the views of local villagers, I conceptualise all the above items—namely, imported products that are not grown or produced within the village and that are

Figure 2. Road leading to Chimna, built in 2018 (a), and houses and fields of Chimna (b).

brought there from the city—as "urban foods." This article will focus specifically on the recent and increasing proliferation of the UPF category, which includes products such as sweets, instant noodles, and SSBs.

The concept of urban food environments emerged to characterise the issues faced by many built city environments, where what are considered negative urban characteristics—in particular, the high presence and accessibility of UPFs—lead to the consumption of unhealthy diets (Westbury et al., 2021). The increasing presence of such foods in people's eating habits is often attributed to the time, price, and access constraints of urban lifestyles—such as busy office schedules, the low cost of ultra-processed products compared to what are considered to be healthier ones, and the impossibility of growing one's own food—as well extensive marketing efforts and consumer unawareness of what is a healthy diet. To understand why urban foods penetrate rural and remote settings such as Chimna, where time, price, and access variables play out in completely different ways (Chimna's inhabitants can grow and make most of their own food products), we need to examine the socio-cultural practices and affective dynamics in which such foods become embedded. In the below vignettes I therefore explore some of the ways in which urban foods—with a focus on UPFs or "junk foods"—are incorporated into Chimna's local food systems. In particular, I show how they have become an essential part of foraging, farmwork, and cattle work (Section 3.1), rooted in villagers' relationships of love and reciprocity (Section 3.2), and offered in religious rituals and other spiritual practices (Section 3.3).

3.1. Urban Foods in Rural Work: A Typical Day With Namgay

Namgay, my host mother, is in her late forties. Originally from a neighbouring village, she now lives in Chimna, where her husband Sonam is from. Her children (in their late twenties) are currently living in urban areas: Dorji is staying in Australia (Perth), while Pema has moved to the closest small town within Bhutan, where her husband works as a teacher. Namgay spends her days working in the fields, looking after her two cows, foraging, and cooking. Sometimes her husband Sonam goes to work in the cardamom fields, and, when he

does, she wakes up earlier in the morning and prepares him a packed lunch in a bamboo basket: she cooks some white or red rice (sometimes homegrown and sometimes imported from India) and wraps it in a cloth, accompanied with a packet of biscuits (Parle-G, Marie Gold, or Good Day) and a bottle of homemade tea or Fanta. I often accompanied her into the forest, where we looked for ferns, mushrooms, bamboo shoots, and wild chestnuts, and worked with her in the fields, where we would weed and harvest various crops. When we got tired, we would sit crossed legged in the grass, and she would take some goodies out of her sack: we enjoyed fried and flattened corn flakes (homemade by her), Parle-G biscuits, Lay's crisps, and raw WaiWai noodles, broken into pieces and mixed with flavouring powders inside their plastic bag. We would also drink tea or Coca-Cola. She then used the empty plastic bottles for all sorts of things: she would fill them with fresh milk from her cows, make pickles in them, or use them as containers for homemade liquor. Sometimes, while foraging together with her cousins from the village, we would stop at one of the new small shops near the house and treat ourselves to a bowl of soupy instant Koka noodles and, occasionally, we would even share a can of beer (Druk Lager or Druk 11000). Later in the afternoon, we would go back home and Namgay would feed the cows. They usually ate leaves that had been foraged in the forest, harvested crop stalks and leftovers from our own food, such as Indian imported white rice and instant noodles. In the evening, she would cook dinner for us, mostly with vegetables picked from her garden and crops from her fields but also with a few imported items (e.g., onions and tomatoes). Sometimes we would mix our rice with Lay's crisps from the shop—which made it savoury and crunchy—or we would accompany our curries with processed bread, brought by visitors or relatives who had been shopping in nearby cities.

Accompanying and helping my host mother working in the fields, foraging, taking care of cattle, and cooking for the family revealed how different kinds of UPFs (as well as other imported food items) have become an important presence in most of her daily chores. Such foods are usually gifted from her daughter and other relatives when they visit from town. Many of them are also bought from the nearby shops, which have all opened in the past year, with the start of the hydropower project. This means that urban foods have entered her practices only recently, due to the development of infrastructure that enables and accelerates connections between Chimna and urban areas (e.g., roads and vehicles). While such products have been circulating, normalised and incorporated into her daily food practices within a short period of time, they don't seem to have changed (or "urbanised") her way of living and working. Instead, they coexist with local foods such as homemade snacks, tea and homecooked meals, are fed to cows (just like other local leftover foods) and their packaging is (re)used for local food practices. Variables that are usually considered in research on urban food environments (such as time constraints, restricted access to fresh products and high price of healthier options) do not apply to Namgay's reality, who receives and incorporates urban foods into daily tasks, which—rather than transforming according to narratives of modernisation—continue to consist predominantly of long-established rural practices. These products have been embedded and adapted to the ways in which Namgay carries out her rural work (Figure 3) through mechanisms which involve predominantly affection, sociality, and culture, such as accepting gifts from her daughter and reusing packaging for other local practices.

Figure 3. Tea, biscuit, and pastry breaks from farmwork and flour grinding.

3.2. Urban Foods as Rural Tokens of Love: Yishe and Her Family

Yishe lives in the house below Namgay's. She is her sister-in-law and best friend. Her first daughter has married a man from a village a few hours away (where she currently lives), while the other works in the same town as Namgay's daughter. Nevertheless, they often visit her and stay with her for long periods of time whenever her grandchildren are off school (mostly during their winter holidays). When they come to see her, they bring chocolate and crisps in shiny packaging, fizzy drinks, and other foods that cannot be found there, such as pasta, cake, and colourful fruits imported from India (for instance, dragon fruits, pomegranates, and different brands of apples). Yishe is happy to receive these gifts from her loved ones. She likes it especially when they bring biscuits in fancy tins such as "Danish butter cookies," as she can then use the container to store other homemade snacks, like freshly popped corn and roasted red rice. She also loves treating her grandchildren while they stay with her. Although she would rarely make instant noodles for herself (she told me she doesn't really like them), she would make them for the kids, taking the time to cook them together with spinach from her garden and eggs from her chickens. One day during the winter holidays, we all gathered at one of the houses nearby, to celebrate the birthday of the oldest lady in the village, grandma Dem, who was turning 100 years old. Everyone was present: her 6 sons and daughters, her 18 grandchildren (including Yishe and Namgay's husband), and over 50 great grandchildren and great great grandchildren. Chocolate, sweets, beers, sweet beverages (which had been brought by her relatives, who had come together to organise her party), and a homecooked meal—prepared by some of the granddaughters—were shared in the garden.

The above insights into the life of Yishe shows the ways in which industrially produced foods are gifted, received, and shared amongst inhabitants during family visits and village gatherings (Figure 4). While such foods also proliferate in this setting, they do not change the ways in which village relationships are formed and maintained, but instead are adapted to village ethics of care, gift exchange, and reciprocity amongst Chimna's inhabitants. Literature around "junk food" in urban settings shows how this kind of products is usually fed to children in contexts of limited economic and time resources and marketed-induced desirability (Chen, 2016; Namie, 2011). The above vignette, on the other hand, shows once again how time, price, and advertising are not variables that apply to Chimna, where such products are prepared together with homegrown foods (e.g., spinach and eggs) and other homecooked meals; where people have plenty of time

(children's winter school holidays coincide with villagers' time of rest from fieldwork); and the marketing of such foods is near to absent. Still, industrial food items are able to penetrate villagers' lives and diets through affective relationships and other social mechanisms, which transform them from urban foods into rural tokens of love.

Figure 4. Sharing "urban foods" (e.g., instant noodles, colourful finger chips, and crackers) and homemade snacks (beaten maize and freshly popped corn). Snacks are stored in recycled biscuits tins and containers.

3.3. Urban Foods as Rural Ritual Offerings: Namgay's Loche and Yishe's Shamanic Practices

While I stayed at Namgay and Sonam's house, I attended their annual ritual (which they call "Loche"), during which blessings are given to the family and luck is attracted for the new year. All households carry out such rituals in the winter season. During Loche, a dozen monks come from the local temple to pray in the family's altar room (every house has a room dedicated to religious practices) and the entire village gathers to eat a meal prepared and offered by the hosts. Several deities are worshipped with food offerings, consisting of local grains, milk, fresh fruits (both local and imported from India), locally distilled alcoholic beverages as well as savoury snacks, instant noodles, and chocolates wrapped in shiny packaging. Bright coloured crisps (which often come in long cylindrical shapes that Namgay, Sonam, Yishe, and other villagers call "finger chips"), also imported from India, make up for beautiful offerings and decorate the altar. At the end of the ritual, all the offerings, sweet and savoury, are mixed together in a big plate (called "tso") and shared amongst relatives and friends. Since it has been offered to the altar, the tso is believed to bring good fortune, so nobody ever refuses to take a bite. Tso is usually composed of fresh fruit slices, packaged sweets, local rice, and cheese, and, of course, yellow, pink, green, and orange finger chips, all mixed together into a colourful plate of blessings.

After staying in Chimna for several months, I also discovered that Yishe is one of the shamans of the village. Each family has in fact a female shaman who is identified by the local astrologer. The shamans must make food offerings to placate animist deities that live in the local forests at least once a year, or they might bring illnesses to their families. In December, I followed Yishe for two days, as she made offerings to several local deities located in different villages of the region. She used to take longer when she had to walk, but since the construction of the road she can go by car and complete all offerings in only two days. She brings all the necessary items in her backpack: each deity has in fact different and specific food preferences that must be respected. When I accompanied her, Yishe offered fresh local products but also branded biscuits, sweets, and chocolates that she had brought from the city. When I asked her how she knew that the deities would like

snacks like chocolates and biscuits, she gave me the following answer: "Deities are like us. Packet foods are not essential like local butter and cow ribs, but they are tasty. They are not needed, but they might like them." Some of offerings are also eaten by people at the end of the ritual, some fed to the cows, and some left in the forest for birds, insects, and other animals.

This final vignette shows how industrially produced items have become embedded even in cultural and spiritual practices that have been historically characterised by the offering of locally grown foods. A similar phenomenon has unfolded in Mexico and other countries with similar religious practices, where SSBs such as Coca-Cola and other "junk foods" (which, in Spanish, are called "Comida chatarra") have been incorporated in local rituals and offerings to deities for decades (Pliego, 2019; Théodore et al., 2023). These products become in fact invested with culturally specific meanings that make sense in the context of the local religion and spiritual practices, like in the case of Namgay and her Loche, or Yishe and her offerings to the deities of the local forests (Figure 5). Such cases show how urban foods become embedded into daily habits through context-specific mechanisms and processes, that are often overlooked and that transcend the logic of consumption presented by most literature on urban food environments. In the below section, I discuss this logic, expanding on the socio-cultural and affective mechanisms that enable the proliferation of urban foods even in spaces that are not urbanising in the way that is imagined by mainstream narratives of modernisation.

Figure 5. Food offerings of finger chips, other branded biscuits, imported fruit (watermelon), and local foraged products (potatoes and other root vegetables) (a); food offering for a shamanic ritual, composed of local items (e.g., cheese and fermented alcohol) as well as ultra-processed products (e.g., biscuits). In the background, local milk for the spirits is stored in a plastic Coca-Cola bottle (b).

4. Thinking Beyond Urban Food Environments

The vignettes show how foods that are usually associated with the city—such as confectionary, processed savoury snacks, and other imported products—have been embedded into villagers' work (crop cultivation, foraging, and cattle rearing), interpersonal relationships (sharing and exchanging food), and spiritual practices (food offerings for gods and local deities). Industrially produced UPF items, contrary to the home grown and produced foods that people are accustomed to eating in the village, originate from logics of commodification, convenience, and individualism, which are usually associated with processes of urbanisation, modernisation, and development. However, once such foods enter Chimna, they are (re)appropriated through villagers' communal ethics of reciprocity and care. Rather than being eaten

individually and with the purpose of saving time, they are cooked together with local ingredients and shared during extended family and community gatherings. Instead of being bought and sold as commodities, they are gifted and accepted to show love and reciprocity between elders and young people that leave the village but also continuously come back. Their colourful packets are not used to attract consumers but to make spiritual offerings more enticing to gods and local deities. Rather than becoming waste, leftovers are fed to cows while plastic and tin packaging is reused for local food practices (e.g., containers for fresh milk, pickles, homemade alcoholic beverages, and snacks). Anthropologist Tsing (2009, 2013, 2015) explains how capitalist commodities, such as these kinds of foods, come in fact into value through non-capitalist social relations, which allow them to become part of particular and heterogeneous ways of life. Rather than focusing only on the commodity value of ultra-processed snack foods in urban areas (e.g., convenience, timesaving, and affordability), we therefore also need to pay attention to the local, socio-cultural, and affective processes which allow industrialised foods to penetrate and become embedded into different diets. Contemporary food systems are in fact complex processes where rurality and urbanity, as well as capitalist and non-capitalist relations entangle, overlap and transform continuously into one another.

Battersby et al. (2024) highlight the need to consider the unique contexts in which food systems operate, denoted by size and location of the setting, existing infrastructure, residents' age, and other demographic and socioeconomic characteristics. According to their report, informality should also be understood as a fundamental part of urban food systems, such as the ways in which UPFs are sold and distributed in Chimna (through informal stalls and gifted by visitors), without any traceability nor systems of control. Far from operating within enclosed urban environments, urban food systems are highly dynamic, variegated, heterogeneous, and differentiated processes (Brenner & Schmid, 2014; Robinson & Roy, 2016). May et al. (2022) observe that people and communities have divergent experiences that may not mesh with top-down narratives of urbanisation, with each group having a different experience of each mode of food circulation. Food systems that are understood as formal, traditional, informal, or alternative overlap continuously in complex ways. While physical infrastructure allows urban foods to expand beyond the city's imagined boundaries and into the village, it is "interpersonal relationships, social obligations, and cultural ties" (May et al., 2022, p. 30) that allow them to penetrate and integrate into people's lives and practices, becoming a key part of local food systems in urban and rural areas alike.

Our personal interviews clearly showed, despite most villagers' low levels of education and inability to read food product labels, a general awareness of the poor nutritional properties and health impacts of an excessive consumption of UPFs, which many of our respondents defined as "not good for your body," "causing sickness," "making people weak," and "being digested quickly and making you hungry." Nevertheless, in Chimna as well as the rest of Bhutan, nutritional and food security problems persist, while the incidence of noncommunicable diseases (one of the leading causes of death in the country) is rising due to shifting diets and other lifestyle changes (Atwood et al., 2014; Ministry of Health, 2020; Minot & Pelijor, 2010; World Health Organization, 2022). An attentive observation of villagers' "rural" daily food practices and the ways in which they make meaning through social, cultural, and affective processes beyond the opinions around foods stated in personal interviews allow us to understand how the urban fabric—in the form of urban foods—is able not only to circulate but to sneakily penetrate into people's lives and bodies, despite having easy access to locally grown foods and homemade meals. Thinking about urban food environments simply as food environments that are located within urban built spaces and that are determined by time, access, price, and education variables, ignores and diverts attention from these kinds of mechanisms, that take place in

Chimna but also within cities. Instead, we need to explore and understand the relational ontology of urban food systems and the broad socio-spatial transformations of food spaces entailed in the urban process (Burgos Guerrero, 2022). Food insecurity and malnutrition should not be understood simply as occurring within urban areas, but as shaped by food systems and their relationships to what are considered rural ones (Battersby et al., 2024; Moragues-Faus & Battersby, 2021). Tacoli et al. (2025, p. 2) suggest that, rather than speaking about rural or urban spaces, we focus on the rural-urban linkages, namely "the complex web of connections across a specific space that can be described as local but is also, increasingly, shaped by translocal linkages reflecting what is happening in other, often distant, places (Zoomers, 2018)."

This exploration of Chimna's villagers' relationship with urban foods within their rural village can hopefully bring new insights and perspectives to the question. Corbett (2016) reminds us that we should not theorise the disappearance of rurality in view of a progressively urbanised modernity but understand the "complex relationships and interdependencies between different spaces within modernising societies that are connected in increasingly complex ways" (pp. 153–154). Rather than perpetrating the imperialism of the urbanism, researchers have started to talk about "rural transformation" (Battersby et al., 2024) or "new rurality." In her work on food security and translocal livelihoods in Ladakh, Dame (2018), for instance, uses the latter expression to refer to the changing circumstances of many rural places in the Global South, increasingly characterised by translocality and off-farm employment.

> While it may be true that the most remote places are connected to and through market forces, it is also true that we have never been urban in the way urbanists imagined us to be: informal social relations, the natural, the problem of food and livelihoods, the need, complex dependencies that nevertheless enable survival. (Krause, 2013, p. 9)

In order to understand contemporary food systems, we need to think beyond space as an absolute and fixed entity (and cities as pre-given sites or containers), but as socially produced through heterogeneous practices and relationships, which involve people as well as other beings. The urban is in fact an agglomeration of overlapping, entangled, and transforming flows, which continuously circulate to and from rural areas. Paying attention to the ways in which the urban fabric circulates and penetrates rural and local contexts such as Chimna can therefore advise our analysis and inform our understanding of the global (Tsing, 2009).

5. Conclusion

While most food issues are now framed around the idea of urban food systems and spaces, the urban is a highly controversial concept (Cabannes & Marocchino, 2018), with the borders between urban and rural having become increasingly blurred. This article aims to challenge the concept of urban food environment by focusing on what Burgos Guerrero (2022) called "extended urban food spaces," namely on how the urban fabric—in this case, urban foods—proliferates beyond urban built spaces. In particular, the article explored how the urban fabric—in the form of industrially produced food items that have been associated with cities and negative health outcomes such as the incidence of noncommunicable diseases—circulates to and in what is considered one of the most remote and rural villages in the landlocked Himalayan kingdom of Bhutan. While the world is presented as increasingly urban, shifting our attention to what is considered rural is a way to pay attention to local practices that are often overlooked and obscured but that actually play an important role in global food mechanisms (Krause, 2013). The way in which Chimna's inhabitants incorporate urban

foods into their supposedly rural practices, shifting them from a capitalist logic of consumption to communal ethics of care, shows how urban foods are able to penetrate local food systems through complex social, cultural, and affective processes (Tsing, 2013). The idea of urban food environments presumes the existence of an external space in which individuals are situated and make their decisions about acquiring, preparing and consuming food and where health outcomes are determined by factors such as spatial distribution, education, time, and affordability of certain food products compared to others. This approach can suggest interventions based on these variables but does not consider the socially constructed aspect of space nor the complex social mechanisms that allow problematic food systems to operate. Frameworks and theoretical lenses such as "extended urban food spaces" (Burgos Guerrero, 2022), "relational territories" (May et al., 2022), and "rural-urban linkages" (Tacoli et al., 2025) can help us to think beyond urban food environments. Issues associated with urban food systems have in fact gone well beyond urban built spaces. Furthermore, by perpetrating the "imperialism of the urban" (Krause, 2013, p. 2), we fail to notice the particular, local, and, in this case, rural processes that allow unhealthy urban food systems to exist, proliferate, and cause harm. Tacoli et al. (2025, p. 1) remind us that a large proportion of people, especially in the Global South, lives in contexts where urban and rural elements are combined, "with high levels of mobility between locations and the diversification of income sources from farm and non-farm activities." The ways in which Chimna's inhabitants engage with urban foods show how urban-rural relationships unfold in complex ways.

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A Radical Reversal of Urban Bias to Create Resilient and Healthy Rural Food Environments

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Abstract

Shaping a healthy food environment requires a comprehensive approach that goes beyond consumption, encompassing the entire system. Urban centers currently depend significantly on agricultural outputs from distant regions, a dynamic that negatively impacts the areas that feed the cities. In the global North, there is a growing awareness of the necessity to improve urban resilience; however, the rural paradox, characterized by persistent food insecurity in regions that are otherwise productive, has received inadequate focus. To uncover the potential ramifications of reversing the perspective, a study was carried out in the Community of Madrid, Spain (7 million inhabitants). We developed a spatial data model to analyze food supply capacity at a local level. Two simulations were run: the first focused on addressing the needs of the metropolitan area, while the second concentrated on the supply requirements of rural municipalities. Two scenarios were defined: one assigned the average legume intake according to statistics from the Ministry, and the other implemented dietary recommendations. Results were conclusive: If production is consumed in the capital, less than 8% of the territory would be covered. However, if larger cities are left out of the equation, food requirements can be met by local production in 62% of the territory. This concept remains theoretical, as most of the necessary facilities and equipment for storage, processing, and delivery are lacking. Establishing healthy food environments depends on realigning priorities and addressing deficiencies in essential components.

Keywords

biodistricts; food environments; legumes; local production; Madrid Region; resilient food systems; rural areas; short supply chains; sustainable diet

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1. Introduction

Poor nutrition from an inadequate diet is a critical risk factor for chronic non-communicable diseases—the leading cause of death and disability worldwide (Habib & Saha, 2010). The impact of food deserts and food swamps on urban populations is well documented (Bridle-Fitzpatrick, 2015; Cooksey-Stowers et al., 2017). The case of limited access to healthy food in rural areas has received less attention and has its own specificities, with a combination of ageing and depopulation, territorial inequalities, lack of infrastructure and services, loss of small businesses, and fragility of markets (Bardenhagen et al., 2017; Camarero et al., 2009; Ramos Truchero, 2015). The concept of food deserts acquires a different dimension and is contested in rural areas, as these are areas of low population density and dispersed population. Residents are assumed to have access to motorized transport and rely on out-shopping—a phenomenon where rural residents travel outside of their local area to shop (Bardenhagen et al, 2017; Lebel et al., 2016)—but this does not apply to the whole population. The loss of small local shops and public transport creates inequalities in access to food, especially for the elderly population, those with reduced mobility, or those with low incomes who do not have a private car.

In Spain, there has not been a total de-structuring of food supply in rural areas; rather, strategies have been developed based on traditions (knowledge about growing and preserving food) and social relations (contacts and cooperation between neighbors, friends, and relatives; Ramos Truchero, 2020). The food distribution sector has also tried solutions in the form of other retail formats, such as mobile sales on regular delivery routes or private home delivery services. Itinerant commerce and fairs can be seen as an intangible cultural manifestation, which in rural areas generally takes place in spaces of cultural heritage, such as village squares, central spaces in the morphology of rural settlements. This combination turns the squares into spaces of collective sociability, with an economic and social multifunctionality (Tiemblo & Pita, 2023).

The food environment encompasses the physical, economic, political, and socio-cultural context in which consumers engage with the food system to make decisions about acquiring, preparing, and consuming food (Pingault et al., 2017). According to the FAO, a healthy food environment creates conditions enabling and encouraging people to access and choose healthy diets (Grace, 2016), a concept that encompasses both safe and nutritious food. Thus, ensuring access to healthy, affordable food in rural areas and their food environments is a crucial challenge if we are to be consistent with the objectives of territorial cohesion, a cornerstone of the European Union's philosophy. But a wider scope is needed to move from food accessibility and food insecurity in terms of retail and purchase options to consider the vulnerability of the whole system. Urban centers are currently highly dependent on agricultural products from distant regions. The vulnerability of their urban food systems has already been documented (Jensen & Orfila, 2021). This urban-centric perspective has led to numerous studies and methodologies aimed at assessing supply capacities concerning the needs of urban settings, as illustrated in recent meta-analyses about the topic (Payen et al., 2022; Schreiber et al., 2021). It is noteworthy that less attention is paid to rural areas, which are considered as production spaces, and often analyzed in terms of resilient agriculture. So, we should consider not only whether there is enough food, but also where it comes from and how it is produced.

This rural perspective, coupled with place-based approaches, can be found in the biodistrict concept implemented mainly in Italy, and to some extent also in the French territorialized projects (Lamine et al., 2023). By mainstreaming sustainable management of local resources, organic production, and local consumption, they contribute to developing more resilient food systems that can withstand and recover

from disruptions, ensuring a reliable supply of food accessible to all. In addition, by creating links between agriculture and other economic sectors and activities, they represent a potential to revitalize rural areas (Stefanovic & Agbolosoo-Mensah, 2023). In Spain, although such specific approaches are in their infancy (at best), elements in place as those explained above could contribute as building blocks for resilient food systems that prioritize food supply to areas close to production through short supply chains.

Promoting local sourcing would reduce dependence on global food flows and facilitate the creation of healthy food environments in rural areas. The analysis of a dual region, such as Madrid (Spain), with a very dense metropolitan area and peripheral rural areas with low population density, will serve to explore the influence and impact on the territory if the destination of production were first to satisfy the closest needs. It is not a rhetorical or theoretical approach; the analysis examines what the organizational and operational implications of reorienting food production towards the immediate local markets would be, as well as the difficulties in doing so.

2. Materials and Methods

The study stems from the assumption that the food system will be more resilient if local goods and short supply chains can be connected to lessen reliance on international food flows. Based on this supposition, the study investigates, on the one hand, the feasibility of relying on certain regional foods, examining the effects of the territorial organization, and whether urban or rural supply is given priority. However, with an emphasis on rural areas, it examines whether the circumstances are favorable for establishing a safe and resilient food system in which local production and consumption are connected.

2.1. Resilient Food Environments: Regional Potential Supply and Influence of Market Priorities

The analysis of self-sufficiency capacity was carried out by selecting only one major food group in a sustainable diet: pulses. Pulses are a rich source of high-quality plant-based protein, fibre, vitamins, minerals, and slow-release carbohydrates. They also improve soil health by providing and mobilizing nutrients such as nitrogen, phosphorus, and micronutrients. They help to increase the amount and diversity of microfauna in the soil and enhance its structure (Caon et al., 2016). So, we start with pulses as an essential component of a healthy and sustainable diet, but the approach can be replicated for other categories of food. The main legume crops in this area have traditionally been chickpeas, carob beans, peas, and broad beans. While these crops have played a central role in the Mediterranean diet, consumption has declined significantly, dropping from 12–14 kg per capita per year in the Madrid region in the 1960s to just 3.5 kg by 2013 (Lázaro & Pato, 2017) and 3 kg today.

Calculations are based on the study of land use and food production. Because it is essential for the research to address the food environment and the reality of access to healthy food, the analysis of land use has been detailed at the municipal level. Publicly available data from the Spanish Agricultural Plots Information System (SIGPAC) for 2024 is used. SIGPAC provides spatially referenced data on land use at the parcel level. Only arable land plots were considered. Since leguminous crops do not occupy all arable land, their proportion has been determined using the statistics on rainfed arable land distribution that are currently accessible at the Community of Madrid level. This detailed information on crops comes from the Survey of Areas and Yields (ESYRCE) of the Ministry of Agriculture, Fisheries and Food (MAPA). According to 2023 statistics

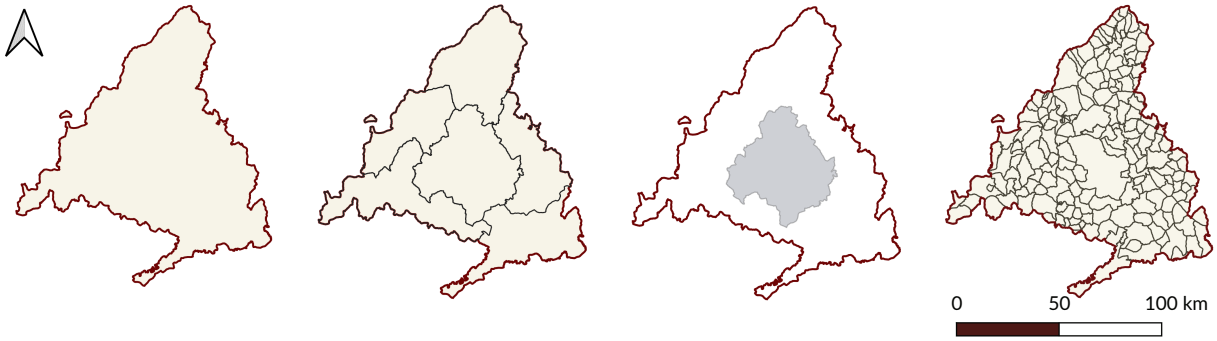
(Subsecretaría de Agricultura, Pesca y Alimentación, 2023), 20% of the rainfed arable land in the Community of Madrid is cultivated with leguminous crops.

Once these areas are known, the yields are calculated. As we are working with sustainable food environment scenarios, one of the factors in achieving these is organic production systems, which have a positive impact on the health of farmers, consumers, and ecosystems. Therefore, our calculations are based on the assumption that all production is organic, and we consider regional-level organic yield statistics published annually by MAPA. We determine the mean yield for the previous five years (2019–2024). We use the yearly consumption figures released by MAPA, which offer regionally broken-down values, to analyze demand. In the Community of Madrid, consumption of pulses is around 3 kg per person per year. In addition to using these actual numbers, the study also compares them to a scenario where the consumption levels—roughly 10 kg of legumes per person annually—that are recommended by the Spanish Agency for Food Safety and Nutrition are met (Ministerio de Consumo, 2022).

Following the collection of production and consumption data, the ability of regional production to satisfy demand is evaluated. At this point, two simulations were run, one concentrating on the supply needs of the metropolitan area, while the second focused on the supply needs of rural communities. Table 1 illustrates the various administrative units used for data collection and model implementation, helping readers to understand the methods and results. These units range from the regional level (Community of Madrid) to municipalities.

In the first scenario, it is assumed that the priority destination of production is the main cities of the metropolitan area, starting with the capital, Madrid, which has 3.4 million inhabitants. In the second scenario, the internal supply capacity of each municipality is first calculated, resulting in a municipal deficit or surplus. From here, a second estimate is made, redistributing the surpluses. This redistribution follows the criteria of proximity (with the nearest neighbor analysis tool of QGIS) and imposes a restriction that they belong to the same agricultural district. This restrictive criterion is because the county is the reference unit for redistribution; counties share structural characteristics and are the reference units for local development plans and local action groups.

Table 1. Madrid Region and the spatial units considered for the analysis.



Region: Community of Madrid	Agrarian District (Comara Agraria) (6)	Metropolitan Area of Madrid	Municipalities (179)

Notes: This research considers the Metropolitan Area to be an agrarian district containing 18 municipalities, but there are other ways of delimiting the Metropolitan Area. Unlike other metropolitan areas, Madrid has no governing structure.

The findings of the first analysis enable inferences about the effects of the production-distribution model. The scenarios for enhancing food security and optimizing areas that attain robust and wholesome food environments remain hypothetical. The processes for the current food supply in rural areas are presented in this second section. Analysis is done on public home-delivered services, mostly for the elderly, and outdoor markets. Together, the studies identify components that should be part of the food system and public policy (e.g., infrastructure and equipment for storage, processing, and distribution).

2.2. Context of the Case Study

Located at the heart of the Iberian Peninsula, the region of Madrid (Community of Madrid) exemplifies the profound territorial, economic, and environmental transformations experienced by metropolitan regions aspiring to global city status. With 7 million inhabitants, the Madrid region has strategically oriented its urban development since the 1980s towards becoming a major hub for services, investment, and international connectivity, constructing extensive transport infrastructures and promoting large-scale urban megaprojects (Córdoba Hernández & Morcillo Álvarez, 2020). As a result, the region has witnessed intense anthropization processes characterized by expansive land consumption and the subordination of traditional land uses, including agriculture, to market-driven urban growth dynamics (Morán Alonso et al., 2025; Observatorio de la Sostenibilidad, 2016).

Agriculture, historically a cornerstone of the region's identity and economy, now represents a marginal share of the regional GDP (0.10%) and workforce (0.75%). Madrid remains a major food consumption center, heavily reliant on external supply chains for its food provision, with imported food products accounting for 98% of its supply (Simón-Rojo et al., 2020). This profound dependence underscores the vulnerability and disconnection between the metropolitan demand for food and the capacity for local production, a pattern that reflects broader trends of agricultural intensification, land abandonment, and environmental degradation observed across the Mediterranean basin (Zimmerer et al., 2022).

The territorial changes associated with urban growth have a direct impact on regional ecosystems. Ecosystem assessments applied to spatial planning show that urban expansion, habitat fragmentation, and the abandonment of traditional agricultural activities are degrading key ecosystem functions (Córdoba Hernández & Camerin, 2024). Among the services most affected are provisioning services such as food production, availability of quality water, and maintenance of fertile soils. The substitution of agricultural uses by urban and peri-urban development reduces the capacity of ecosystems to maintain these essential services, increasing dependence on external supply chains and weakening the food and environmental security of the area (Córdoba Hernández & Camerin, 2023).

From the point of view of agricultural territorial organization, the Community of Madrid is divided into six agricultural districts (comarcas), recognized by the regional administration for rural analysis and planning (Figure 1): (i) Lozoya-Somosierra, to the north, with a strong forestry and extensive livestock orientation; (ii) Guadarrama, to the west, with a mountainous and mixed character; (iii) Área Metropolitana de Madrid, in the center, highly urbanized and with very residual agriculture; (iv) Campiña, to the east, dominated by non-irrigated arable crops; (v) Sur Occidental, in the south-west, with mixed agriculture and increasing urbanization; and (vi) Las Vegas, in the south-east, one of the most fertile areas thanks to the Tajo and Tajuña river systems.

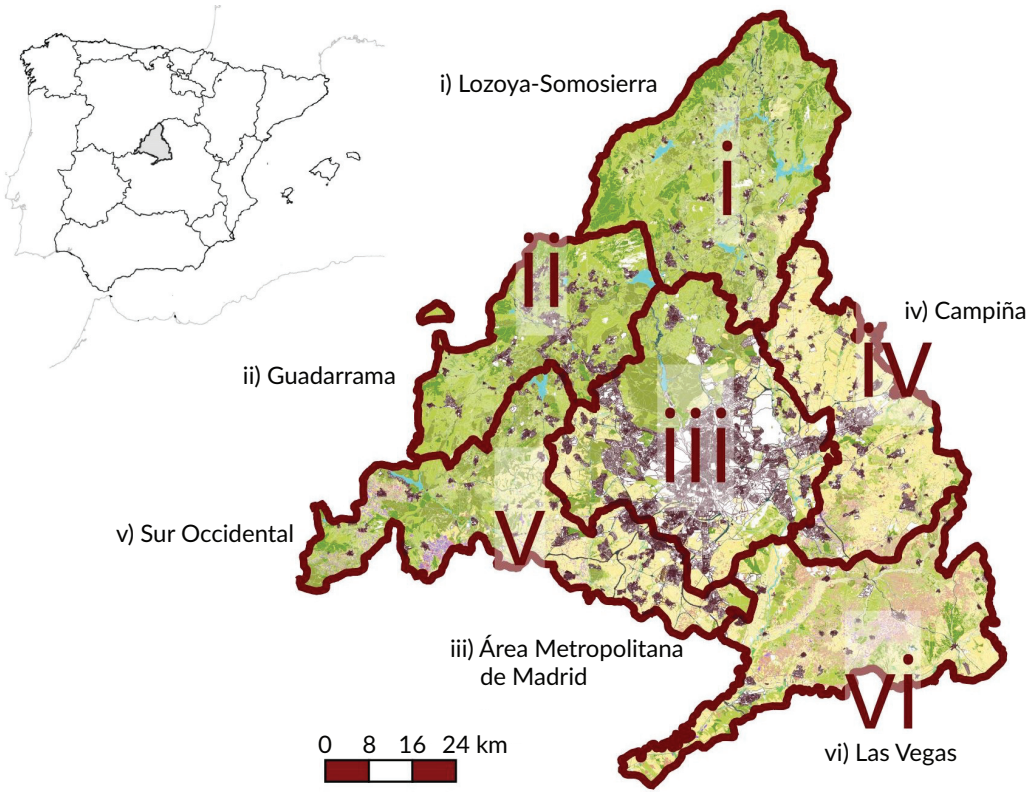


Figure 1. Location of the case study and distribution of agricultural districts (comarcas).

This division reveals profound territorial disparities between rural areas—more dependent on the natural environment and with low population densities—and the metropolitan area, where urban pressure and the abandonment of traditional agricultural uses prevail. Of the 179 municipalities that make up the Community of Madrid, 111 have fewer than 5,000 inhabitants (62.01%), reflecting a clear predominance of small rural towns in contrast to the densely urbanized metropolitan area around the capital, where ten municipalities account for six million inhabitants. Rural areas also have the highest proportion of elderly people. A significant proportion of small municipalities exhibit an elevated elderly ratio, defined as the proportion of individuals over the age of 65 relative to those below the age of 16. In 72% of the municipalities with a population of less than 1,000 inhabitants, the elderly ratio is over 150%. These patterns confirm a marked urban-rural duality, with very different socio-economic and land-use dynamics.

The Participatory Local Development Strategies 2023–27 for the Madrid region are the roadmaps for the allocation of LEADER funds. In the south-eastern comarcas (iv and vi), the strategy includes actions such as the creation of micro-enterprises for the processing and marketing of agricultural products, support for the retail trade of local products, the digitalization of commercial activities, or the promotion of new distribution channels for local products (ARACOVE, 2025). For its part, the Sierra Oeste region (v), with a group of 22 municipalities in the Association for Local Development, defined actions for strengthening links with the retail sector and creating direct sales outlets, as well as taking advantage of the proximity of urban Madrid as a consumption center (ADL Sierra Oeste de Madrid, 2025).

3. Results: The Effect of Place-Based Approaches That Prioritize Proximity

Two simulations were conducted, as previously mentioned: one aimed at first meeting the needs of the larger urban areas (Madrid capital city) and the other focused on the supply requirements of rural communities.

3.1. Current Pulse Consumption Scenario

In the Community of Madrid, the area dedicated to leguminous crops, considering organic yields, could produce food to meet the needs of almost 2,725,000 people, taking into account the current average consumption of 3 kg of pulses per person per year (i.e., 39% of the region's population). Based on these data, the first model prioritizes supply according to the demographic weight of the municipality. In other words, the priority destination of regional production would be the most populated areas, starting with the capital, Madrid.

The results presented in Figure 2a show that with the current production capacity of organic legumes on the current cultivated area, the demand of 2.7 million people could be satisfied, that is, 80% of the 3.4 million inhabitants of this city, according to the current consumption patterns of pulses. If the entire production were to be directed to the most populated nucleus, less than 8% of the territory of the Community of Madrid would be supplied. The remaining municipalities would not receive any local pulses. In other words, 92% of the territory and 61% of the population of the Community of Madrid would be completely unsupplied.

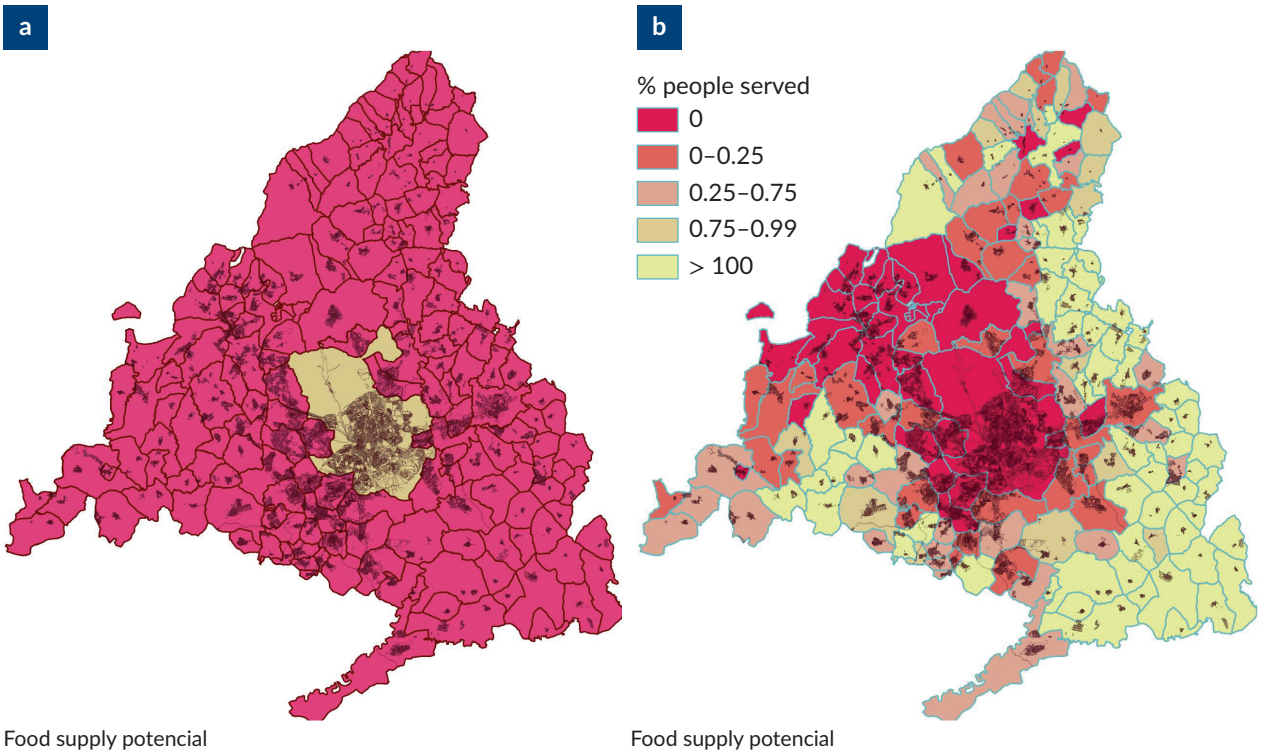


Figure 2. Pulses provision at the municipal level with current consumption level 2. Black dots represent the urban and rural settlements: (a) Supply priority to the capital city, Madrid, and (b) supply priority based on proximity. Source: Elaborated by the authors based on SIGPAC (https://sigpac.mapa.gob.es/fega/visor), ESYRCE (https://www.mapa.gob.es/es/estadistica/temas/estadisticas-agrarias/agricultura/esyrce), and INE statistics.

The map on the right (Figure 2b) depicts that in the case of local supply priority, so that pulses are consumed in the same municipality where they are produced, the number of municipalities where the demand for pulses is fully covered is 99, representing 52% of the territory and 39% of the population. There are significant differences between regions, with the metropolitan area being the most deficient, while those with better production capacity (such as Las Vegas and Campiña) or lower population density (Lozoyuela Somosierra) are better supplied.

3.2. Scenario of Pulse Consumption Based on Dietary Recommendations

If the recommended consumption of pulses (an average of 10 kg per person per year) is taken as a basis for calculations, regional production would only cover the needs of almost 820,000 people, or 12% of the population. If all production were directed to the main population center, the city of Madrid, it would cover the needs of 24% of its population. The remaining municipalities (178, 99% of the total) would not receive any local pulses (Figure 3a).

Giving priority to local supply, so that pulses are consumed first in the municipality where they are produced, would mean that with the recommended consumption of pulses, 61 municipalities (32% of the territory of the Community of Madrid) would be able to meet their needs (Figure 3b).

If a redistribution of municipalities with a surplus to nearby municipalities with a deficit is established, respecting the regional organization in Comarcas, the number of municipalities served would increase to 115 (62% of the territory; Figure 3c).

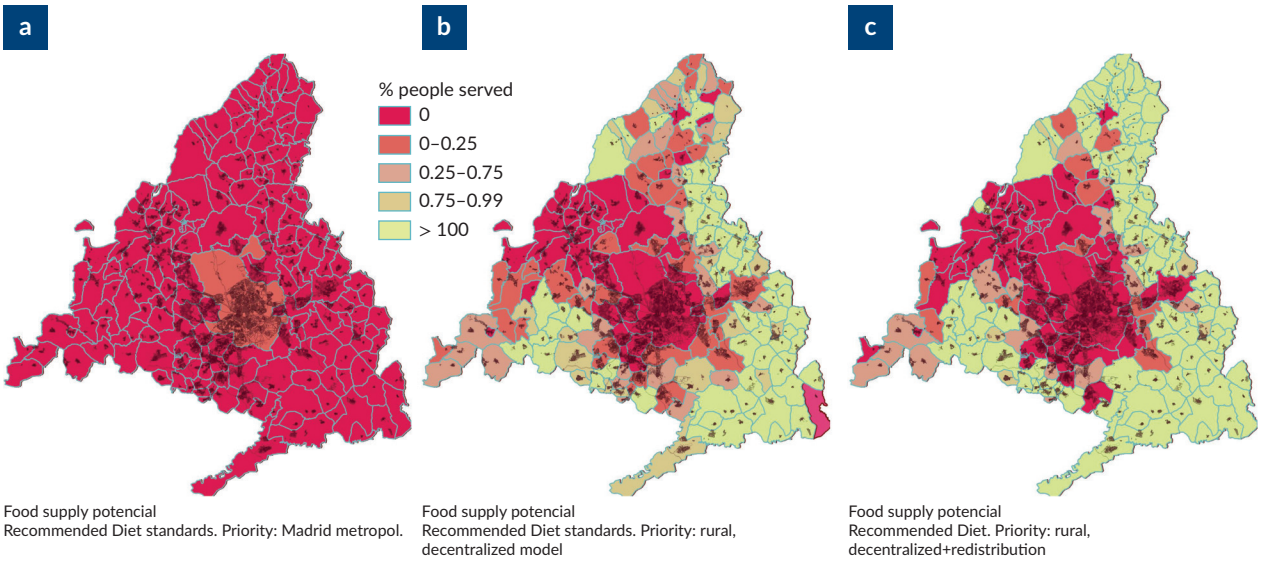


Figure 3. Pulses provision at the municipal level with recommended consumption levels: (a) Supply priority to the Metropolitan area; (b) supply priority based on proximity; and (c) supply priority based on proximity and redistribution. Source: Elaborated by the authors based on SIGPAC, ESYRCE, and INE statistics.

In short, the potential for self-sufficiency in an overpopulated region such as the Community of Madrid is limited. At current consumption levels of pulses, it could meet the needs of 39% of the population, a figure that falls to 12% if the per capita consumption levels recommended by health authorities are reached. Beyond

these totals, the study shows that depending on the distribution model and supply priority chosen, there is a significant impact on the extension of the territory covered. In the centralized model, a single municipality, the capital, could absorb the entire production and would still have to import 20% or 80% of the pulses consumed, depending on the diet considered. The rest of the municipalities (92% of the territory) would be completely dependent on external supplies. In the second model, which prioritizes local production, the needs of 52% of the territory can be met at current consumption levels and 62% at recommended consumption levels with a redistribution scheme between close municipalities.

3.3. Food Access, From Farmers' Markets to Itinerant Rural Markets

Farmers' markets play a key strategic role in promoting healthy food environments in both urban and rural areas. In the Community of Madrid, La Despensa de Madrid (Madrid's Pantry) is organized by the regional government. They take place on weekends between May and October in rotation between 19 municipalities, most of which are in the metropolitan area. Each municipality hosts one of these markets once a year, providing a platform for local farmers to sell their produce directly. Their main aim is to promote local and "zero-kilometer" agri-food production, allowing people to taste, buy, and discover products such as meat, beer, vegetables, dairy products, honey, teas, oils, bread, and traditional sweets, many of which have a designation of origin. This type of activity functions as a showcase to spark interest and raise awareness. Notwithstanding its present limited frequency, these markets are a component of the regional government's plan to support locally produced, high-quality goods that are designated as "M Certified Products." The ultimate objective of this plan is to encourage healthier and more sustainable eating habits, stimulate the rural economy, and help to create local jobs.

Itinerant outdoor markets, on the other hand, are regular and permanent throughout the year, with fixed days and locations determined by each town council. They cover most of the region's municipalities and provide a complementary way of improving access to fresh food and encouraging the consumption of local produce. They offer a wide range of products, from food and clothing to household items. In contrast to La Despensa de Madrid, these markets have a commercial rather than a promotional focus, and their accessibility makes them a key element in the daily supply of many households, especially in areas with little commercial infrastructure. Conversely, these markets do not specialize in local or organic produce. This difference in periodicity, purpose, type of product, and level of institutionalization underlines their complementarity within the Madrid food system. As shown in Figure 4, coverage of these markets is extensive, with only the northern highlands and a few scattered municipalities devoid of one.

4. Discussion

The results highlight the potential impact of adopting a food environment perspective that takes into account not only the availability of food, but also its origin, with rational distribution criteria. In the Madrid region of Spain (7 million inhabitants), an assessment of the production and human consumption of pulses shows that if priority is given to meeting the needs of the metropolitan area, only the capital (1 out of 179 municipalities) can meet them, and only partially. If the big cities are left out of the equation, the food needs of 62% of the territory can be met by local production, even by an increase in pulse consumption to adapt it to healthy diet recommendations. This would imply a more sustainable management of local resources through organic production and short food supply chains, in line with the principles guiding the design of biodistricts (Dias

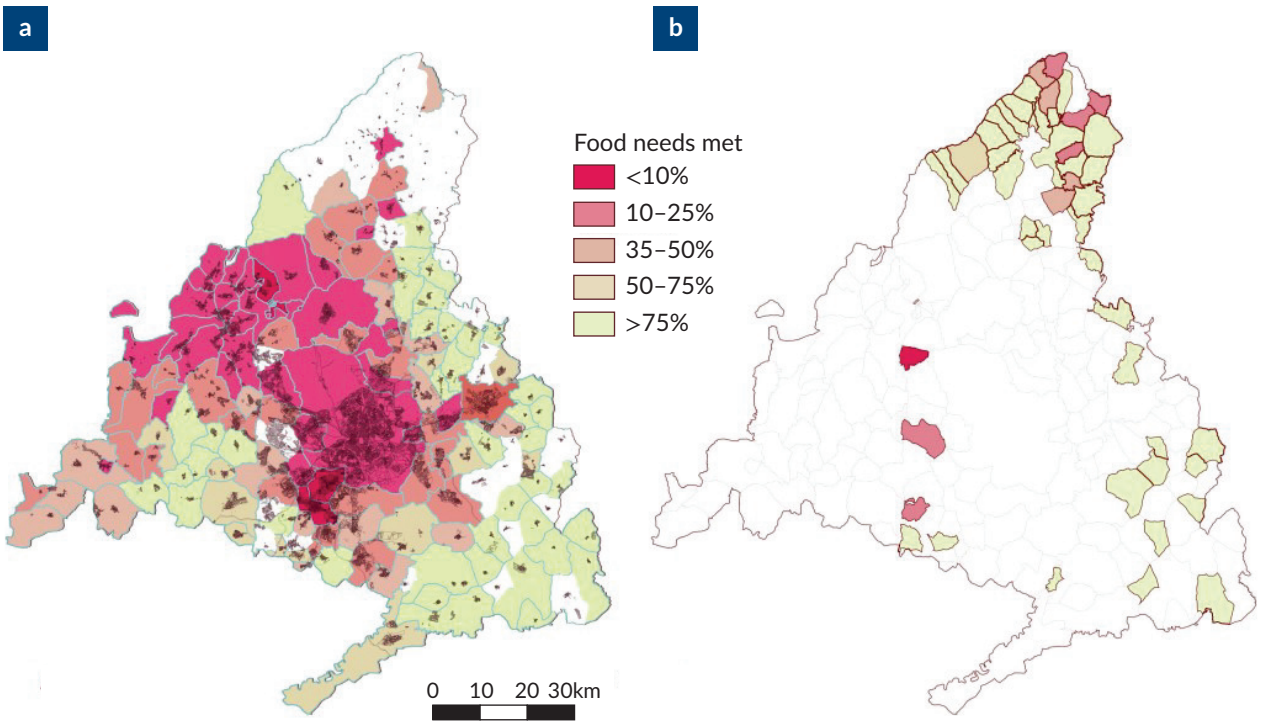


Figure 4. Food access through itinerant outdoor markets (scenario of current pulse consumption patterns and proximity priority for supply): (a) Municipalities with one or more weekly open markets and (b) municipalities with no open market. Source: Elaborated by the authors based on Infosierrademadrid (2025).

et al., 2021; Lamine et al., 2023). The number of people that can be fed does not change, but the area that must be covered by food from outside, with all the transport and logistical implications, is reduced.

These findings have three possible implications for territorial governance, food system policy, and rural and urban planning: (a) the spatial requirements for pulse production coherent with the recommended healthy diet; (b) the territorial reorganization to facilitate short supply chains; and (c) the potential consequences of such a reorganization if incorporated into sectoral policies. First, the results suggest that ways of improving productive capacity in order to meet food needs should be explored. Previous studies explain the complementary opportunity offered by a dietary and agroecological transition (Aguilera & Rivera-Ferre, 2022). A dietary pattern that prioritizes lean meat and limits consumption to three to four servings per week (350 g) could significantly reduce the amount of land currently devoted to feed production—mainly fodder and cereals—used in intensive livestock systems. This shift in demand would allow extensive cropland to be redirected towards the production of food for direct human consumption. However, previous research has shown that this is not applicable in Madrid, where local production capacity, dedicated to extensive livestock farming, only covers 5.4% of dairy and meat needs (Álvarez del Valle, 2017).

The hypothesis that more agricultural land would become available because it would no longer be needed for growing animal feed proved false. However, other alternatives emerge: Recognizing the strategic importance of currently underutilized or abandoned agricultural land is one of the steps to boost productive capacity. The concentration of production, the structural marginalization of rural areas, and market dynamics oriented towards urban centers are driving the abandonment of agricultural land (Schuh et al., 2020). However, a significant proportion of these areas still have soil and ecological conditions suitable for agricultural

production, making them viable candidates for recovery through agro-ecological approaches (Simón Rojo et al., 2021). Revitalizing these underutilized areas could contribute not only to strengthening food security and diversifying production but also to revitalizing rural economies by creating decent jobs, supporting population maintenance, and preserving agricultural landscapes (Stefanovic & Agbolosoo-Mensah, 2023). Given the aging population and the lack of generational renewal, an additional concern is who will live and farm in rural areas. The Madrid Regional Government is aware of this problem and has a Revitalization Plan (Comunidad de Madrid, 2025), which includes a strategic pillar aimed at incorporating young people through subsidy programs. While it is interesting to note that the agroecological sector has a lower average age of farmers, it requires specific support policies. These policies include public investment in infrastructure and equipment to provide complementary services to production and facilitate logistics (Simón Rojo, 2022), a measure that the plan already mentions concerning livestock farming and is directly linked to the following idea of territorial re-organization. Secondly, place-based approaches and short supply chains to connect production and consumption in rural areas imply territorial restructuring (Winarno et al., 2020).

The creation of food hubs serving agricultural districts—providing logistics services and aggregating production to create a commercial offer of proximity—would be an interesting avenue for development that has yet to be pursued. Without them, the concept of boosting local production remains theoretical, as most of the necessary facilities and equipment for storage, processing, and delivery are lacking. Establishing healthy food environments, of which safe food is an essential component (Grace, 2016), depends on realigning priorities and addressing the deficiencies in essential components. Nevertheless, the Participatory Local Development Strategies 2023–27 in the region of Madrid (ARACOVE, 2025), while mentioning the diversification of marketing channels and the promotion of short channels, do not specifically mention the distribution model.

Thirdly, it should be mentioned that the local consumption model will not work if it is not profitable for small retailers and traveling merchants. In this sense, a major problem with local sourcing is the low turnover typical of rural areas and the consequent loss of food quality. This is one of the main reasons (along with price) for the preference for out-shopping: "Out-shopping can negatively affect the local rural economy, as revenues shift from local to outside businesses, whereas money that is spent in the local area can provide an economic multiplier effect and help sustain an area's economy" (Bardenhagen et al., 2017, pp. 10–11). Faced with the need to look for alternatives, public policies could draw on other elements typical of the cultural context, such as bars and bar-shops. They already serve as supply spaces and could expand their functions in rural contexts. Just as there is the concept of social agriculture with its support programs, there would be social retail (social bars) with its own lines of financing, creating a virtuous circle (Dias et al., 2021).

Finally, shaping a healthy food environment requires a comprehensive approach that goes beyond consumption, encompassing the entire system. The Communities of Care project in six rural Spanish municipalities identified access to health, social, and commercial services, especially food and medicines, as one of the main problems of the aging population. The institutional response is to provide transport services on demand to go to the health center or, in some cases, to buy food. This project proposed how to increase food autonomy through local spaces, such as a warehouse or shop that could host collective purchasing initiatives from consumer groups (Comunidades de Cuidados, 2022).

Home-delivered food programs for the elderly and people with complex dependency needs can contribute to strengthening the links between local production and consumption and generate local employment, supported by the social economy, through initiatives such as rural cooperatives of proximity services (Fajardo & Escribano, 2020) or community-supported agriculture initiatives such as ASDECOBA's Manos Verdes project, which produces, transforms, and distributes its products in rural areas. Public procurement can play a role in providing stability for farmers, boosting the articulation of the agroecological ones in the Region (Simón-Rojo et al., 2020).

In Brazil, the federal Food Acquisition Program and the National School Feeding Program are paradigmatic examples of the potential of programs of food public procurement and proactive policies "in providing market space for family farmers and to strengthen the position of the family farm sector" (Wittman & Blesh, 2017, p. 86).

5. Conclusion

The research is innovative in its approach, going beyond the urban-centric perspective commonly applied when assessing supply capacities concerning the needs of urban settlements. The innovative approach is implemented on three levels: (a) proximity supply is prioritized; (b) the scope of the food environment is expanded to consider not only the availability of food but also the origin and connection to the territory; and (c) a territorial lens is aimed to reconsider public policies to prioritize proximity supply as a way to build resilient food systems.

Results are conclusive: If production is consumed in the capital, less than 8% of the territory would be covered; if larger cities are left out of the equation, food requirements can be met by local production in 62% of the territory. Although only one food group (pulses) has been analyzed and the scope of the research needs to be extended, these findings already have strong policy implications. Moving towards a more resilient and healthier food environment requires re-orientation, an interweaving of food policies with social, development, and agricultural policies. Policies should be translated into strategic activation of facilities, backed up with specific public measures.

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Conflict of Interests

The authors declare no conflict of interests.

Data Availability

The database on food needs and provision, detailed at the municipal level, can be found here: https://doi.org/10.21950/CCF03Y. Further inquiries can be directed to m.simon@upm.es.

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